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ORGANIZING IMAGES FOR POPULATION
AND DEVELOPMENT ASSISTANCE

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Roger Alan Coate, B.A., M.A.

* * * * *

The Ohio State University
1977

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Department of Political Science
To my wife, Pat,
without whose devoted assistance
this study would not have been possible.
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CHAPTER I
INTRODUCTION

In recent years the nature of the impact of population growth and change on social and economic conditions has become an increasingly important question confronting decisionmakers in assistance granting organizations. The traditional there-is-a-population-explosion view held by many such policymakers, scholars and population experts in more economically advanced societies has been challenged vigorously by their counterparts in many less economically advanced societies. A substantial portion of the debate has centered around the question, "Is there a need for efforts directed specifically toward reducing population growth as contrasted with general social and economic development?" Much of the controversy has centered on the nature of the dynamic feedback relationships which exist between demographic variables and social and economic variables. Different individuals perceive the cause-effect relationships existing between such variables in very different ways.

The dominant orientation prevailing in much of the developed, non-socialist (Western) world (including much of Asia) is that there is a need for such specific policies aimed at reducing population growth. According to this viewpoint, demographic factors are considered as integral components of economic development. Thus, population growth is argued to strongly affect economic and social
development variables and is, in turn, affected by them. Under this image even very strenuous efforts at development may fail, unless measures aimed at reducing population growth are undertaken simultaneously with social and economic development policies.

Numerous individuals and groups of individuals included under this perspective have tended to speak and act as though the only important relationship to consider is the impact of population growth and change on economic and social development. Such a viewpoint has led these individuals to propose family planning programs as the answer to development related problems. Previous assistance activities of the Office of Population and Humanitarian Assistance of the United States Agency for International Development have tended to reflect this perspective.

The other, contending basic viewpoint argues that population growth is a wholly derivative effect of social and economic development. The effects of demographic variables upon social and economic development were perceived to be inconsequential.

These two conflicting mental models (images) of the nature of the relationship between population growth and social and economic conditions serve as a point of departure for the present study. Decision-makers in assistance granting organizations possess images of cause-effect relationships existing between demographic factors and social and economic conditions which may or may not correspond to reality. A general assumption on which this study is based is that the extent of such correspondence has profound implications for the formulation and relative success of population assistance policies.
It is assumed that decision-makers act in reference to their perceptions (images) of reality, not in reference to reality itself. Such images may or may not be close approximations of reality. Following the argument put forth by Michael Brecher (1974) "to the extent that they (image and reality) differ... policy acts will be unsuccessful -- in the measure that decision-makers misconstrue, distort or deviate from the reality of the environment within which they must act." Images of reality thus act as the basis against which alternative policy outputs are evaluated and with reference to which those outputs selected are initiated.

Although others (for example, see: de Rivera (1968), Holsti (1962), Jervis (1968), and Sprout and Sprout (1956)) have utilized the idea of "image" in discussions of decision-making, none have done so as eloquently as Kenneth Boulding (1959: 120-121):

The 'image' must be thought of as the total cognitive, affective and evaluative structure of the behavior unit, or its internal view of itself and its universe. A decision involves the selection of the most preferred position in a contemplated field of choice. Both the field of choice and the ordering of this field, by which the preferred position is identified, lie in the image of the decision-maker.

As stated by Boulding in the last sentence, both the field of choice and the ordering of this field are determined by the causal image (mental model) of the decision-maker. Thus, to the extent that the decision-maker's image diverges from reality, it is quite possible that an entire given field of choice (alternative policies being considered) might be wholly inappropriate, given the actual state of the referent system.
The late J. D. Thompson (1972: 14) has labelled the process by which policy actions are derived, given the existence of such images, as "technical rationality."

Instrumental action is rooted on the one hand in desired outcomes and on the other hand in beliefs about cause/effect relationships. Given a desire, the state of man's knowledge at any given point in time dictates the kinds of variables and the manner of their manipulation to bring that desire to fruition.

Thus, differences in "beliefs about cause/effect relationships" (images) can lead different policy decision-makers, possessing similar tools, to undertake quite different policy actions.

A main focus of this study is the formulation of population/development policies in assistance granting organizations. The task environments in which these organizations function are extremely complex and non-intuitive. The general nature of the conflicting positions discussed above reiterates this point. However, the mental models (images) possessed by decision-makers in organizations specifically concerned with providing population/development assistance might not always allow these individuals to perceive the implications of such complexity. "Decision-makers have many different mental images, each dealing with a wide range of overlapping problems, and each, inconsistent with the others" (Phillips, 1973: 3). Such mental models are often rather ambiguous. Thus, it is difficult for decision-makers to perceive these contradictions. Such ambiguity also makes it difficult to "manipulate" the variables in such models. "That is, the complexity of social phenomena makes it almost impossible to move from a vague set of assumptions about the world through the dynamic
consequences these assumptions have upon the impact of various policy alternatives" (Phillips, 1973: 3). Thus, policies and programs based upon such mental images might tend to have undesirable or "counter-intuitive" results (Forrester, 1971).

An important challenge which confronts social scientists is the discovery of ways to assist individuals in authoritative (value allocating) positions to better understand the implications of differing images for the attainment of organizational goals. The present research endeavor attempts to confront this challenge with respect to organizations operating in the area of population/development assistance activities. In doing so, a policy science frame of reference is employed (see Lasswell and Lerner, 1951; and Lasswell, 1971). Such an approach focuses on various aspects of the decision process and is characterized by three principle attributes.

The first is contextuality: decisions are part of a larger social process. The second is problem orientation: policy scientists are at home with the intellectual activities involved in clarifying goals, trends, conditions, projection, and alternatives. The third is diversity: the methods employed are not limited to a narrow range. (Lasswell, 1971: 4)

The policy sciences approach is grounded in the idea of social process models. "The simplest representation of a social process emphasizes the participants (the actors), the flow of interaction (the interacts), and the resource environment:

Actor ------ Actor
Actor ------------- Resource environment,"
(Lasswell, 1971: 15-16)
In an extended form we can speak of "categories of reference to this shaping and sharing of outcomes (values) by employing practices (institutions) that in the context are relatively specialized to each value" (Lasswell, 1971: 18). Thus, the revised social process model can be presented simply as

Participants $\rightarrow$ seeking to satisfy values (attain goals) $\rightarrow$ utilize institutions $\rightarrow$ affecting resources.

Goals play an important role in a social process model. Goals limit and help determine the courses of action to be followed and the institutions to be utilized.

As the research question has been posed, organizations can be viewed as goal-seeking decision systems. "By goals we shall mean value premises that can serve as inputs to decisions" (Simon, 1964: 3). Organizational goals, when viewed from a social process frame of reference, are the desired relationship between an organization and its environment. By focusing on organizational goals, it does not necessarily follow that the organization is being reified. It is to be readily acknowledged that in a technical sense only individuals possess goals. However, a distinction needs to be made between personal goals and role defined ("organizational") goals. Personal goals represent the valued outcomes of individual participants based on personal inducements and contributions. Personal goals are linked closely to the personal motives of individuals who fill organizational roles or positions.

---

1This general definition is the same employed by Thompson and McEwen (1972).
Simon (1964) argues that the goals which underlie the decisions made in an organization are only indirectly linked to personal motives. In the decision-making situations of real life, a course of action, to be acceptable, must satisfy a whole set of requirements, or constraints. Sometimes one of these requirements is singled out and referred to as the goal of the action. But the choice of one of the constraints, from many, is to a large extent arbitrary. For many purposes it is more meaningful to refer to the whole set of requirements as the (complex) goal of the action (Simon, 1964: 7).

In organizational decisionmaking many of the requirements and constraints that define a satisfactory course of action are associated with organizational roles, especially roles at the upper levels of the organization's hierarchy (Simon, 1964:21). Such requirements and constraints that delimit organizational goals are assumed to be generally shared by organizational participants. When viewed in this way organizational goals serve as useful devices for testing the satisfactoriness of proposed solutions to problems encountered in the organization's outer environment.

The utility of social process models for the present research endeavor can be demonstrated by examining an illustrative diagram of an artificial system structure (Simon, 1969; Thorson, 1974; and Anderson, 1974). Figure 1 represents such a structure. Note that the artificial system has five major parts: the inner environment (I.E.), the outer environment (O.E.), the image of the O.E. (M), the access interface (AI), and the observation interface (OI). In the present study the inner environment includes the structure and process features of a particular organization. The outer environment encompasses everything external to this decision unit. The national
FIGURE 1
ARTIFICIAL SYSTEM STRUCTURE
political, social and economic systems in which the organization interacts are considered to be aspects of this outer environment.

With reference to the research problem at hand, two general aspects of the outer environment must be considered. These include: 1) the interrelationships among the social, economic, and geophysical subsystems, and 2) the network of organizations and institutions operating in connection with those subsystems. More specifically, the focus of attention will be on those organizations involved in problem solving activities with respect to demographic aspects of social and economic growth and change in less economically advanced societies.

The observation interface includes those parts of the organization which are responsible for collecting information about conditions in the outer environment. The access interface is that portion of the decision unit which is responsible for implementing decisions made within the unit and for generally interacting in the outer environment.

The image represents the beliefs held by I.E. decision-makers regarding the cause-effect relationships occurring in the outer environment. As was stated above, a major assumption underlying this study is that decisions are made with regard to such images, rather than to the actual interrelationships occurring in the O.E. Thus, the image looms as a critical element in the decision-making process.

Given a goal or set of goals regarding the O.E., the decision unit will attempt to develop strategies, based on the interpretation of the information concerning conditions in the O.E. which is developed with regard to the image. The decision process can be viewed as
beginning with a goal or set of goals regarding the state of the O.E. Information filtered through the image, regarding conditions in the O.E. is brought in through the observation interface. The assessment of the state of the O.E. is compared with the desired state, given the goal set.

Based upon the perceived discrepancies between the goal state of the O.E and the perceived state of the O.E, the decision mechanism begins to search for behaviors it could emit to move the O.E closer to the goal state. The decision mechanism uses its causal model of the O.E to assess the degree to which a given behavior or set of behaviors will increase the level of goal attainment. When the decision mechanism discovers a set of behaviors it deems acceptable, it instructs the AI to emit those behaviors. Because of the manner in which the decision system uses its causal model, both the behavior and structure of the OI and AI are affected by the content of the model. The OI will only be sensitive to those features of the environment the M has identified as important. The behavior of the AI will obviously depend to a great deal upon the content of the M. . . (Anderson, 1974: 15).

Thus, the decision process takes on new character when viewed in the context of a larger social process.

As was stated earlier, the main puzzle which this research endeavor addresses is the discovery of ways to assist individuals in authoritative positions in population assistance granting organizations to better understand the implications of their images for the attainment of organizational goals. Viewing the activities of such organizations from a social process frame of reference sets the stage for investigating this concern. The present study focuses on four selected organizations involved in population related assistance activities. These organizations are: The Office of Population in the Bureau of Population and Humanitarian Assistance of the United States Agency
for International Development, the United Nations Fund for Population Activities, the Population Council, and the Ford Foundation.

The second primary attribute of the policy sciences approach, problem orientation, provides the basis for organizing the main research objectives (identified below) into a coherent research strategy. In regard to this, Lasswell (1971: 78) has posited five fundamental problem solving tasks:

1. clarification of the goals of decision;
2. description of the trends toward or away from the realization of these goals;
3. analysis of the constellation of conditioning factors that appear to have affected past decisions;
4. projection of probable future developments, assuming no influence by the observer;
5. formulation of particular objectives and strategies that contribute, at minimal net cost and risk, to the realization of preferred goals (emphasis added).

Based on these five tasks, numerous research objectives are specified. The organizational goals of the four selected population assistance granting organizations need to be identified and clarified. What sets of requirements and constraints delimit the valued outcomes in the four organizations? Seeking an answer to this question is the task undertaken in Chapter II below.

Data on these organizations were drawn from two primary sources: organizational publications and intraorganizational communications. Then, informal interviews were conducted with high ranking officials in the organizations to clarify areas of uncertainty and to obtain additional information.
The second main objective is to describe the general trends at regional and global levels toward or away from the realization of such organizational goals. Such a description is presented in Chapter III. That discussion presents a description of both the trends of social, demographic and economic conditions throughout the world and localized (national) efforts to deal with the consequences of such trends.

Chapter IV then begins by examining transnational responses to population growth and change. In the context of such responses the international "debate" concerning the nature of the interrelationships among demographic, social, and economic variables is discussed. A synthesis of the competing positions in the "debate" is the third main objective of the study.

Contrasting positions regarding this controversy were derived both from positions put forth in international forums and from scholarly writings on the subject. Information concerning the competing positions articulated in international forums was obtained from summaries of proceedings of international conferences, national governmental and international organizational press releases, and secondary sources.

The fourth main objective is to critically examine and synthesize the findings of scholarly research into the interrelationships among demographic, social, and economic variables. A review of such research is divided into two fairly distinct parts. One body of literature pertains to the social and economic determinants of demographic change. This literature, discussed in Chapter V, tends to focus around the idea
of "demographic transition." Both theoretical and empirical studies are reviewed.

A second body of literature focuses on the impacts of demographic change on social and economic factors. Almost the entire discussion of such influences is dominated by a review of attempts at constructing demographic-economic models. This predominant focus on such models generally reflects the nature of the scholarly concern in this area. This literature is examined in Chapter VI.

Then, in Chapter VII the findings of the above bodies of research are more critically examined. This task is carried out as follows. First, various clusters of hypothesized relationships are synthesized. Second, the data problems involved in testing such hypothesized relationships are discussed. Finally, based on the findings from the reviews of the two bodies of literature and on the discussion of analysis constraints, a simple system dynamics flow-chart is constructed and discussed.

Examining the implications of competing images and empirical research findings for the projection of future demographic-economic developments is the fifth main research objective and is treated in Chapter VIII. A specific system dynamics computer model is employed to serve as a basis for such investigation.

A model was needed which closely possesses all the major inter-relationships articulated with respect to the Western oriented image. The simulation selected is the one-region integrated model "SAINT 2," constructed under the directorship of Mihajlo Mesarovic at Case Western Reserve University in Cleveland, Ohio, USA. The selection of
this model was not based on any explicit criteria of empirical validity. The primary factor affecting the choice was the model's correspondence to one particular image of the interrelationships among demographic, social and economic variables, that image supported by a vast majority of Western social scientists and decision-makers in assistance organizations. SAINT 2 is thus treated as a model consistent with the general image identified as the Western image.

During the simulation runs, experimentation was conducted in which various possible alternative parameter estimates were input into the model so that the effects of such "policy options" upon the model could be observed. The objective of conducting such scenarios was to examine the effects of alternative policies on the attainment of organizational goals, given the nature of the system as modelled. The simulation results will not tell organizational decision-makers which policy options would be more successful in any specific application. What the scenarios can do, however, is to provide such decision-makers with a better understanding of the interrelationships of the model elements (as structured) through model interaction over specified time periods.

The final research objective is exploring the implications of the findings of the above investigations for organizational action. "Who can do what, with respect to what goals, with what likely effects?"

This research question is also addressed in Chapter VIII. A basis upon which such questions can be confronted must first be established.
CHAPTER II

TRANSMATION POPULATION ASSISTANCE: A MICRO PERSPECTIVE

Introduction

The main objective of this chapter is the identification and clarification of the organizational goals of four selected population assistance organizations. The following six-part discussion seeks to achieve that objective. The first part presents a general background of transnational population assistance. Such a discussion provides the reader with an overview of the important actors in this field. The second part examines more closely the general nature of organizational goals with specific reference to population assistance. The final four parts then explore the organizational goals of the four selected organizations.

Background

A substantial proportion of funds allocated and/or expended for family planning activities by developing governments which have such plans come from external sources. The role of transnational assistance in such activities is illustrated in Table 1. More than two-thirds of the governments listed depend on external sources for at least 40 percent of their total expenditures for national family planning programs. Nearly one-third of the governments listed receive more than two-thirds of their total funding for such programs from external sources. Population assistance is generally provided to
TABLE 1

PROPORTION OF NATIONAL FAMILY PLANNING PROGRAM FUNDS PROVIDED BY EXTERNAL SOURCES, FOR 23 GOVERNMENTS WITH NATIONAL FAMILY PLANNING PROGRAMS

<table>
<thead>
<tr>
<th>Government</th>
<th>Year</th>
<th>Budget Status</th>
<th>Amount of External Funds</th>
<th>Proportion External Funds of All Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>1971</td>
<td>1</td>
<td>1,398</td>
<td>17%</td>
</tr>
<tr>
<td>Colombia</td>
<td>1974</td>
<td>2</td>
<td>3,924</td>
<td>69%</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>1974</td>
<td>2</td>
<td>911</td>
<td>78%</td>
</tr>
<tr>
<td>Dominican Rep.</td>
<td>1974</td>
<td>2</td>
<td>536</td>
<td>54%</td>
</tr>
<tr>
<td>El Salvador</td>
<td>1973</td>
<td>1</td>
<td>617</td>
<td>56%</td>
</tr>
<tr>
<td>Ghana</td>
<td>1973</td>
<td>1</td>
<td>196</td>
<td>23%</td>
</tr>
<tr>
<td>Gilbert and Ellice Islands</td>
<td>1973</td>
<td>1</td>
<td>65.4</td>
<td>67%</td>
</tr>
<tr>
<td>Guatemala</td>
<td>1974</td>
<td>1</td>
<td>637</td>
<td>90%</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1974</td>
<td>2</td>
<td>371</td>
<td>51%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1974</td>
<td>1</td>
<td>13,139</td>
<td>52%</td>
</tr>
<tr>
<td>Iran</td>
<td>1974</td>
<td>2</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Kenya</td>
<td>1974-1978</td>
<td>1</td>
<td>26,600*</td>
<td>73%</td>
</tr>
<tr>
<td>Korea, Rep.of</td>
<td>1974</td>
<td>1</td>
<td>2,944</td>
<td>40%</td>
</tr>
<tr>
<td>Mauritius</td>
<td>1974</td>
<td>2</td>
<td>355</td>
<td>62%</td>
</tr>
<tr>
<td>Nepal</td>
<td>1974</td>
<td>1</td>
<td>507.6</td>
<td>43%</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1974</td>
<td>1</td>
<td>10,500</td>
<td>42%</td>
</tr>
<tr>
<td>Philippines</td>
<td>1974</td>
<td>2</td>
<td>4,000</td>
<td>36%</td>
</tr>
<tr>
<td>Rhodesia</td>
<td>1974</td>
<td>2</td>
<td>386</td>
<td>41%</td>
</tr>
<tr>
<td>Singapore</td>
<td>1974</td>
<td>1</td>
<td>6</td>
<td>0.5%</td>
</tr>
<tr>
<td>Taiwan</td>
<td>1974</td>
<td>1</td>
<td>225</td>
<td>16%</td>
</tr>
<tr>
<td>Thailand</td>
<td>1974</td>
<td>1</td>
<td>3,655</td>
<td>85%</td>
</tr>
<tr>
<td>Tunisia</td>
<td>1974</td>
<td>1</td>
<td>2,428</td>
<td>47%</td>
</tr>
<tr>
<td>Turkey</td>
<td>1974</td>
<td>1</td>
<td>134</td>
<td>5%</td>
</tr>
</tbody>
</table>

Notes: National family planning programs for which budgetary data was not available have been excluded. External sources include international agencies, foreign governments and private organizations.

a amount of external funds are given in thousands of U.S. dollars;
b exclusive of amounts paid by clientele;
c amount allocated for five-year plan, 1974-1978;
d includes proceeds from sales of contraceptives and services;
e excludes indirect contribution to the program from the health network.

Source: Mortman, 1975: Table 9, pages 35-38.
national programs and private associations in response to specific requests.

Until the late 1960's, four nongovernmental organizations served as the main sources of assistance for population activities. These organizations were Population Council, International Planned Parenthood Federation, Ford Foundation, and Rockefeller Foundation. The first government to give assistance for population activities was Sweden. In 1958, Sweden provided modest assistance to Ceylon, and in 1961 to Pakistan. The Government of the United Kingdom began providing modest assistance in 1964, as did the U.S. government in 1965. However, it was not until the late 1960's that governmental sources began giving population assistance on a large scale.

Between 1960 and 1973, international assistance in the field of population increased over one hundred-fold from around $2 million (1960) to over $220 million (1973). Figure 2 illustrates this dramatic increase. This period has witnessed a shift from predominance of nongovernmental funding (96 percent of all population assistance funding in 1960) to governmental funding (82 percent in 1972). In 1972 the government of the United States of America provided over 62 percent of all such funds, after deductions are made for double counting. Table 2 provides data on assistance for population activities by major donors for the period 1960-1973. Taking the entire time period covered by the table as a whole, United States governmental funds account for over half of all assistance funds expended for population activities.
Figure 2

Volume of International Assistance for Population Activities by Major Donors 1960-1972

Source: Table 2.

(Thousands of Dollars)
### TABLE 2
**ASSISTANCE FOR POPULATION ACTIVITIES BY MAJOR DONORS, 1960-1973**

(Thousands of dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>Australia</th>
<th>Region</th>
<th>Europe</th>
<th>Multilateral Organizations*</th>
<th>Non-governmental Organisations</th>
<th>Total Fund Aid</th>
<th>Total Technical Assistance</th>
<th>Total Official Development Assistance</th>
<th>United States</th>
<th>United Kingdom</th>
<th>Salaries</th>
<th>Total Net Capital</th>
<th>Total Net Grant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>1,214</td>
<td>1,722</td>
<td>1,772</td>
<td>3,552</td>
<td>2,532</td>
<td>22,776</td>
<td>22,776</td>
<td>22,776</td>
<td>197,400</td>
<td>197,400</td>
<td>197,400</td>
<td>22,776</td>
<td>22,776</td>
</tr>
<tr>
<td>1972</td>
<td>1,650</td>
<td>1,721</td>
<td>1,771</td>
<td>2,530</td>
<td>2,530</td>
<td>22,752</td>
<td>22,752</td>
<td>22,752</td>
<td>197,200</td>
<td>197,200</td>
<td>197,200</td>
<td>22,752</td>
<td>22,752</td>
</tr>
<tr>
<td>1971</td>
<td>1,650</td>
<td>1,721</td>
<td>1,771</td>
<td>2,530</td>
<td>2,530</td>
<td>22,752</td>
<td>22,752</td>
<td>22,752</td>
<td>197,200</td>
<td>197,200</td>
<td>197,200</td>
<td>22,752</td>
<td>22,752</td>
</tr>
<tr>
<td>1970</td>
<td>1,144</td>
<td>1,721</td>
<td>1,771</td>
<td>2,530</td>
<td>2,530</td>
<td>22,752</td>
<td>22,752</td>
<td>22,752</td>
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<tr>
<td>1969</td>
<td>1,650</td>
<td>1,721</td>
<td>1,771</td>
<td>2,530</td>
<td>2,530</td>
<td>22,752</td>
<td>22,752</td>
<td>22,752</td>
<td>197,200</td>
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<tr>
<td>1968</td>
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<td>1,721</td>
<td>1,771</td>
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<td>22,752</td>
<td>22,752</td>
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<td>1967</td>
<td>1,650</td>
<td>1,721</td>
<td>1,771</td>
<td>2,530</td>
<td>2,530</td>
<td>22,752</td>
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<td>22,752</td>
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<tr>
<td>1966</td>
<td>1,650</td>
<td>1,721</td>
<td>1,771</td>
<td>2,530</td>
<td>2,530</td>
<td>22,752</td>
<td>22,752</td>
<td>22,752</td>
<td>197,200</td>
<td>197,200</td>
<td>197,200</td>
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<tr>
<td>1965</td>
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<td>1,771</td>
<td>2,530</td>
<td>2,530</td>
<td>22,752</td>
<td>22,752</td>
<td>22,752</td>
<td>197,200</td>
<td>197,200</td>
<td>197,200</td>
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<td>22,752</td>
</tr>
<tr>
<td>1964</td>
<td>1,650</td>
<td>1,721</td>
<td>1,771</td>
<td>2,530</td>
<td>2,530</td>
<td>22,752</td>
<td>22,752</td>
<td>22,752</td>
<td>197,200</td>
<td>197,200</td>
<td>197,200</td>
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<tr>
<td>1963</td>
<td>1,650</td>
<td>1,721</td>
<td>1,771</td>
<td>2,530</td>
<td>2,530</td>
<td>22,752</td>
<td>22,752</td>
<td>22,752</td>
<td>197,200</td>
<td>197,200</td>
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<td>22,752</td>
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<tr>
<td>1962</td>
<td>1,650</td>
<td>1,721</td>
<td>1,771</td>
<td>2,530</td>
<td>2,530</td>
<td>22,752</td>
<td>22,752</td>
<td>22,752</td>
<td>197,200</td>
<td>197,200</td>
<td>197,200</td>
<td>22,752</td>
<td>22,752</td>
</tr>
<tr>
<td>1961</td>
<td>1,650</td>
<td>1,721</td>
<td>1,771</td>
<td>2,530</td>
<td>2,530</td>
<td>22,752</td>
<td>22,752</td>
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<td>197,200</td>
<td>197,200</td>
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<tr>
<td>1960</td>
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<td>197,200</td>
<td>197,200</td>
<td>197,200</td>
<td>22,752</td>
<td>22,752</td>
</tr>
</tbody>
</table>

*Provisional.

fNot available.

*Some adjustments to the data for multilateral organizations (not to the totals) have been made by UNF to include more recent data.

Bilateral assistance accounts for a substantial portion of all funding for population activities. In 1972 over 46 percent of all such funding was provided by governments on a bilateral basis. Considering the entire period 1960-1973, over 90 percent of all bilateral funding was provided by two governments: United States and Sweden. In 1972 the government of the United States provided nearly 88 percent of all such bilateral funding. By far the largest portion (71 percent in 1972) of such aid goes to fund family planning activities. However, substantial amounts also go to fund general demographic (five percent in 1972) and biomedical (17 percent in 1972) research. Well over half (61.8 percent in 1972) of United States governmental population assistance is given on a strictly bilateral basis (World Bank, 1974: Annex Table 19: 190-191). As will be demonstrated later, the U.S. government is also the predominant supplier of funding for multilateral population activities.

At the multilateral (governmental) level, the United Nations Fund for Population Activities (UNFPA) and the World Bank have been the dominant funders of population assistance activities. Since 1972 the UNFPA has greatly expanded both the scope of its funding and general coordination activities. Thus, this organization today is one of the largest assistance granting organizations in the area of population.

This general introduction to population assistance organizations has been provided to give the reader a general overview of the

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1 These figures are taken from Table 5 below.
important actors in this field. The discussion in the remainder of this chapter will focus specifically on four of the most dominant of these organizations: Office of Population and Humanitarian Assistance of the United States Agency for International Development, Population Council, Ford Foundation, and the United Nations Fund for Population Activities.

Organizational Goals and Population Assistance

Let us return momentarily to Thompson's discussion of "technical rationality." He (1972: 14) argued that

Instrumental action is rooted on the one hand in desired outcomes and on the other hand in beliefs about cause/effect relationships. Given a desire, the state of man's knowledge at any given point in time dictates the kinds of variables and the manner of their manipulation to bring that desire to fruition.

With reference to his idea of technical rationality, Thompson, perhaps more concisely than anyone before or since, has articulated the importance of considering the interrelationship of organizational goals and image for understanding organizational behavior.

Much of this study has been concerned with the identification of general images regarding the interrelationship among demographic, social, and economic factors in organizations' outer environments. Although no attempt has been made to measure the precise cause-effect images possessed by decision-makers in population assistance organizations, it is argued that a consensus exists regarding the general nature of such interrelationships and the resulting impact of rapid population growth on social and economic conditions within developing
regions. In 1974, Michael Teitelbaum discussed the development of such a consensus. He stated (1974: 756-757) that

... the consensus holds that policies and programs are required both for general development and for specific population concerns, and that these complementary efforts ought to be components of all international development assistance. Thus, population programs are seen to justify the investment of a proportion of the resources available for development, though their requirements tend to be small relative to other development needs.

It should be noted that Teitelbaum's article was written and appeared prior to the World Population Conference in Bucharest discussed in detail below. As became apparent at that conference, the consensus referred to by Teitelbaum was not a global consensus. However, among the members of the "international population community" such a consensus was argued to have existed. According to Finkle and Crane (1975: 95-96) this community of interests included: population experts around the world, population units with various United Nations bodies and specialized agencies, nongovernmental organizations involved in population, and population offices of those governments most concerned about population problems. The views of this "international population community" met strong opposition at Bucharest.

Much of the discussion in the first section of Chapter I dealt with the role that images play with regard to organizational behavior. However, as suggested by Thompson, "instrumental action" results from the interplay of images and organizational goals.

In this chapter as we examine specific population assistance organizations, the main focus will be on the identification of
organizational goals. As was mentioned in Chapter I, goals are defined as "value premises that can serve as inputs to decisions" (Simon, 1964: 3). Organizational goals are desired states of affairs which the organization attempts to realize in its environment. Organizational goals are distinguished from personal goals in that they are associated with organizational roles, not personalities.

When we come to organizational decisions, we observe that many, if not most, of the constraints that define a satisfactory course of action are associated with an organizational role and hence only indirectly with the personal motives of the individual who assumes that role. In this situation it is convenient to use the phrase, organizational goal, to refer to constraints or sets of constraints, imposed by the organizational role, which has only this indirect relation to the motives of the decisionmakers.

In view of the hierarchical structure that is typical of most formal organizations, it is a reasonable use of language to employ organizational goals to refer to the constraint sets and criteria of search that define roles at the upper levels (Simon, 1964: 21).

Thus, to Simon goals are treated as constraints on organizational decisionmaking.

An important element for understanding the relationship between abstract values and organizational action is the set of constraints on organizational decisionmaking. It seems appropriate, therefore, to include such constraints in the definition of organizational goals.\(^2\)

\(^2\)This definition is similar to the one used by Etzioni (1964), Hall (1972), and Thompson and McEwen (1972).

\(^3\)March (1962: 194-195) identifies three alternative approaches of conceptualizing goals of organizations. In one approach the goals of the entrepreneur are specified as the goals of the organization. A second approach attempts to identify goals that are held in common by the various organizational participants. A third approach defines organizational goals as desired states of affairs which result as a consequence of a continuous bargaining-learning process; March (1962: 195).
The distinction made by Hall (1972: 83-84) between "official" goals and "operative" goals underlies a similar concern. "Official" goals are defined as the general formally stated purposes of the organization, whereas "operative" goals designate the ends sought through the actual operating policies of the organization. "Operative goals reflect the 'desired state of affairs,' or abstract official goals, the modifications and subversion of these by personnel in decision-making positions, and the force of pressures from the external environment. It is the combination of official goals with internal and external factors that leads to an existing set of operative goals (Hall, 1972: 84-85).

Such a definition is not too dissimilar from the present definition of organizational goals. Thus, whichever term is employed, it is necessary to identify not only the value premises but also other major requirements that must be satisfied by the solution to a problem.

With reference to the four assistance organizations, constraints can be distinguished into two general classes: constraints shared

(footnote 3 continued)
differentiates such a process into three subprocesses: 1) bargaining among potential members of the organization; 2) internal organizational procedures; and 3) the process by which objectives change as a result of experience. March favors the use of this third approach. Such an approach, while not incompatible with the present definition, does not adequately consider factors external to the decision-making process and participants. Hall (1972: 82-83) makes a similar criticism of Simon's definition of organizational goals.
across organizations and constraints specific to each organization. Interorganizational shared constraints will be discussed first. Then, each of the four organizations will be identified and organization specific constraints will be specified with reference to valued outcomes.

The idea of the existence of an "international population community" possessing a broadly conceived consensus image of the nature of the interrelationships among demographic, social and economic variables was briefly discussed above. The importance of such a consensus becomes apparent when the nexes of core-problems are considered with which the resulting organizational behaviors are supposed to deal.

The consensus position begins with a frank recognition that population growth is not the only, or even the primary, source of the poverty, disease, illiteracy, and gross inequality which now characterize the world. The ultimate solution to such problems depends on the true social and economic development of the poor countries and regions of the world (Teitelbaum, 1974: 754).

Thus, a basic constraint regards the relative allocation of scarce funds for finding solutions to such problems. Given the lack of solid evidence regarding the impact of fertility control programs on the social and economic well-being of the populations in poor societies, the organizations will tend to favor further research critically evaluating current population programs. In addition, even though population growth is generally not viewed as the primary cause of the numerous problems listed above, the built-in momentum for further growth(to be discussed in Chapter III below) provides a constraint which might require that fertility control programs be included as necessary components of development policy. However, "the consensus position
recognizes that whatever the population problem might be, it is not uniform throughout the world" (Teitelbaum, 1974: 754). Thus, a general constraint exists against making universal prescriptions.

Another general shared constraint is the institutional setting, the transnational population assistance funding network. Where does the money for fertility control programs come from? What is the nature of the linkages of the various organizations involved? Finally, what are the implications of this network for constraining organizational behavior?

In general, multilateral funding activities have been growing in importance in recent years. Several governments, Sweden and the Netherlands, have reduced their bilateral funding activities as multilateral aid has become more available.

Table 3 provides an initial identification of some of the most important organizations involved in transnational assistance activities. Figure 3 provides a much more complete picture of the total transnational population assistance network. This figure depicts funding linkages among the various organizations involved in this network. Several points should be remembered when examining the network. First, the linkage arrows specified in the figure do not illustrate relative magnitudes of funding linkages. A few organizations, such as USAID, Swedish International Development Authority (SIDA), Ford Foundation, Rockefeller Foundation, and UNFPA, are more important internal network funding agents relative to most of the other organizations. Second, the names of governments have been utilized in place of the specific
### TABLE 3

**MAJOR GOVERNMENTAL FUNDERS OF POPULATION ASSISTANCE PROGRAMS - 1973**

- Government of Australia
- Government of Belgium
- British Ministry of Overseas Development
- Canadian International Development Agency (CIDA)
- Danish International Development Agency (DANIDA)
- Department for International Development Cooperation of the Ministry for Foreign Affairs of Finland
- Federal Ministry for Economic Cooperation of the Federal Republic of Germany
- International Cooperation Agency of the Ministry of Foreign Affairs of Japan
- International Development Research Center (ICRC) of the Government of Canada
- Government of Netherlands
- Government of New Zealand
- Norwegian Agency for International Development (NORAD)
- Swedish International Development Authority (SIDA)
- Government of Switzerland
- United States Agency for International Development
FIGURE 3. POPULATION ASSISTANCE INTERORGANIZATIONAL FUNDING LINKAGE NETWORK

*Country name represents governmental body providing funding. For specific organization, see Table 20, page 82.
governmental organizations in charge of administering such funding activities. Table 4 provides a more specific listing of such governmental organizations.

The United States Agency for International Development is linked either directly or indirectly to nearly every other major funding organization (excluding primary donors). Table 4 provides a breakdown of recipients of population funding assistance from the United States Agency for International Development (USAID) in 1973.

Thirdly, linkages identifying the relationships between the numerous assistance granting organizations and projects and programs in developing societies are not specified. Different organizations provide different kinds of assistance activities. For example, along with other activities, USAID supplies contraceptives to more than 70 societies. The International Planned Parenthood Federation supports member associations in 79 societies. Recent projects include the establishment of a clearinghouse for teaching aids for population activities in collaboration with UNESCO and UNFPA. The IUSSP, WAY, and the International Confederation of Midwives provide educational, informational and advisory services on population matters to members and affiliates. In contrast, the Rockefeller Foundation heavily supports biomedical research and technical assistance for family planning programs.

Table 5 presents organizational assistance to population programs by type of activities for 1972. In terms of a general profile, bilateral governmental assistance in 1972 accounted for 46.4 percent of


<table>
<thead>
<tr>
<th>Organization</th>
<th>Funding (thousands of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNFPA (19,000)</td>
<td></td>
</tr>
<tr>
<td>IPPF (12,104)</td>
<td></td>
</tr>
<tr>
<td>Population Council (7,280)</td>
<td></td>
</tr>
<tr>
<td>Pathfinder Fund (6,735)</td>
<td></td>
</tr>
<tr>
<td>Family Planning International Assistance Church World Service</td>
<td></td>
</tr>
<tr>
<td>Population Services International</td>
<td></td>
</tr>
<tr>
<td>World Assembly of Youth</td>
<td></td>
</tr>
<tr>
<td>World Education</td>
<td></td>
</tr>
<tr>
<td>American ORT Federation</td>
<td></td>
</tr>
<tr>
<td>American Public Health Association</td>
<td></td>
</tr>
<tr>
<td>Association for Voluntary Association (1,000)</td>
<td></td>
</tr>
<tr>
<td>Pan American Health Organization</td>
<td></td>
</tr>
<tr>
<td>Latin American Demographic Center</td>
<td></td>
</tr>
<tr>
<td>Latin American Center for Studies of Population and Family</td>
<td></td>
</tr>
<tr>
<td>universities (14,100)</td>
<td></td>
</tr>
<tr>
<td>Interdisciplinary Communications Programme, Smithsonian Institution</td>
<td></td>
</tr>
<tr>
<td>TOTAL: $125,554</td>
<td></td>
</tr>
</tbody>
</table>

*Figures in parentheses are dollar amounts (thousands of dollars) of funding provided to selected organizations in 1973.

# TABLE 5

**ASSISTANCE TO POPULATION PROGRAMS BY TYPE OF ACTIVITIES, 1972**

(Kousands of U.S. dollars)

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Assistance</th>
<th>Direct Assistance</th>
<th>Indirect Assistance</th>
<th>Family Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bilateral</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>17</td>
<td>324</td>
<td>187</td>
<td>472</td>
</tr>
<tr>
<td>Canada</td>
<td>2,594</td>
<td>2,066</td>
<td>588</td>
<td>755</td>
</tr>
<tr>
<td>Denmark</td>
<td>358</td>
<td>358</td>
<td>358</td>
<td>358</td>
</tr>
<tr>
<td>Japan</td>
<td>1,031</td>
<td>1,031</td>
<td>1,031</td>
<td>1,031</td>
</tr>
<tr>
<td>Netherlands</td>
<td>341</td>
<td>341</td>
<td>341</td>
<td>341</td>
</tr>
<tr>
<td>Norway</td>
<td>51</td>
<td>74</td>
<td>25</td>
<td>41</td>
</tr>
<tr>
<td>Sweden</td>
<td>1,222</td>
<td>1,222</td>
<td>1,222</td>
<td>1,222</td>
</tr>
<tr>
<td>United States</td>
<td>1,749</td>
<td>1,749</td>
<td>1,749</td>
<td>1,749</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>396</td>
<td>1,749</td>
<td>1,749</td>
<td>1,749</td>
</tr>
</tbody>
</table>

| **Multilateral organizations** |                  |                   |                    |                 |
| UNFA          | 482              | 109               | 23                 | 1,090           |
| FAO           | 13               | 13                | 13                 | 13              |
| UNESCO        | 153              | 20                | 20                 | 20              |
| ILO           | 11               | 20                | 20                 | 20              |
| UNDP          | 8                | 7                 | 7                  | 7               |
| UNICEF        | 6                | 6                 | 6                  | 6               |
| World Bank    | 344              | 4                | 4                 | 4               |
| **Total**     | 545              | 132               | 132                | 132             |

| **Other agencies** |                  |                   |                    |                 |
| Planification    | 36               | 36                | 36                 | 36              |
| NSS               | 6,087            | 6,087             | 6,087              | 6,087           |
| Population Council | 25             | 25                | 25                 | 25              |
| Rockefeller      | 35               | 35                | 35                 | 35              |
| **Total**        | 592              | 592               | 592                | 592             |


*Extracted from World Bank, 1974.*
all population aid activity. Assistance funneled through multilateral organizations accounted for 26.5 percent, with the remaining 25.1 percent coming from private agencies.

It is apparent from Table 5, however, that across categories these three general types of assistance organizations provide differing concentrations of funds. Bilateral governmental donors provide 69.4 percent of all assistance funds going to purchase family planning supplies, 69 percent of general demographic funds, 65 percent of demographic training funds, 61 percent of funds going to research on economic and social demography, 52.8 percent of funds for family planning training, and 51 percent of all funds going to hire family planning advisors. Multilateral governmental organizations provide 96 percent of all assistance funds going for demographic advisors and 74.8 percent of funds for demographic surveys and censuses. Private agencies are the predominant funders of family planning research (72 percent of all such funds) and biomedical research (52.7 percent of all such funds).

As was stated above, numerous United Nations-related bodies are involved in population assistance activities. The list includes five specialized agencies (WHO, FAO, UNESCO, ILO, and the World Bank), and a variety of organs within the UNO (Population Division of the U.N. Secretariat, Population Commission, UNFPA, UNICEF, UNDP, ECA, ECE, ECLA, ECAFÉ, ECWA, UNIDO, and five demographic and training centers).

Each of the five specialized agencies has developed a special procedure and/or apparatus for handling population matters. Within WHO the Division of Family Health was delegated the chief responsibility in this area. Other WHO units concerned with population
include: Health Statistics Division, Division of Strengthening of Health Services, and Health Manpower Division. In the World Bank population projects are prepared and monitored by the Population and Nutrition Projects Department. Research and policy work is carried out in the Population and Humanitarian Resources Division of the Development Economics Department. UNESCO considers population matters in the Population Coordination and Research Unit in the Social Sciences Department.

The ILO and FAO have slightly different administrative structures, however. In ILO population matters dealing with overall organizational interests are considered in the Technical Cooperation Department, as is coordination of UNFPA funded projects. In other matters each technical unit is responsible for the development of its own population activities. In FAO the Interdepartmental Working Group on Population, chaired by the head of the Economic and Social Policy Department, provides advice concerning the development of policies and programs (United Nations Secretariat, 1974: 644-645).

In the United Nations Organization the Population Division carries out programs recommended by the Population Commission. Each regional economic commission has its own population division or section. These commissions conduct work programs in coordination with the Population Division, and must report periodically to the Population Commission.

The United Nations Fund for Population Activities has a secretariat headed by the Executive Director. The functions of the secretariat are to formulate policy, conduct external relations and to promote population programs. In January, 1974, UNFPA was reorganized
to include two new units: Population Planning Division and Project Division.

Two formalized bodies have been established to coordinate population assistance activities among various U.N.-related bodies. In 1967 the Administrative Committee on Coordination created the Sub-Committee on Population. This committee is chaired by the Director of the Population Division of the Secretariat and contains representatives from WHO, FAO, UNESCO, ILO, World Bank, UNICEF, UNFPA, and the regional economic commissions. This body conducts systematic evaluations of agency programs.

The Inter-Agency Consultative Committee of UNFPA was formed to promote intersecretariat cooperation with respect to population activities funded by UNFPA (United Nations Secretariat, 1974: 645).

As of December 31, 1974, $153,449,249 had been paid by governments to UNFPA. Of that amount nearly 97 percent was donated by 14 governments.\(^4\) Table 6 presents an accounting of UNFPA contributions to organizations for population programs in 1974. The $68 million in UNFPA contributions to population programs in this one year represents approximately 45 percent of total government payments into the Fund during the first eight years of the Fund's existence (UNFPA, 1975: 32-33). This fact reiterates the point that the activities of the UNFPA, as well as most other bodies providing multilateral population assistance, have greatly increased in the last few years.

\(^4\)These governments are identified in Figure 3 above and Table 3 above.
**TABLE 6.**

UNFPA CONTRIBUTIONS TO POPULATION PROGRAMS BY ORGANIZATION IN 1974

<table>
<thead>
<tr>
<th>Organization</th>
<th>Amount (U.S.$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNO</td>
<td>20,761,508</td>
</tr>
<tr>
<td>WHO</td>
<td>11,539,483</td>
</tr>
<tr>
<td>UNFPA</td>
<td>9,737,232</td>
</tr>
<tr>
<td>UNDP</td>
<td>8,827,342</td>
</tr>
<tr>
<td>UNICEF</td>
<td>6,389,630</td>
</tr>
<tr>
<td>UNESCO</td>
<td>4,810,957</td>
</tr>
<tr>
<td>ILO</td>
<td>3,613,023</td>
</tr>
<tr>
<td>FAO</td>
<td>1,838,634</td>
</tr>
<tr>
<td>IPPF</td>
<td>857,744</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>68,375,553</strong></td>
</tr>
</tbody>
</table>

Source: UNFPA, 1975.
By comparing overall population assistance to total official development assistance for the period 1961-1972 several interesting observations emerge (see Table 7). First, while total official development assistance increased 65 percent during this period, population assistance increased 3200 percent. Secondly, the relative percentage of population assistance of all development assistance also increased markedly from a miniscule 0.1 percent in 1961 and 1962 to 2.3 percent in 1972. A final observation, however, seems even more revealing. The relative proportion of population assistance of all development assistance, even in 1972, is very small.

A closer examination of governmental assistance for population assistance activities demonstrates that the relative percentage of such assistance of total official development assistance varies considerably from government to government (see Table 8). For the largest population funder, the United States, population assistance represents 3.6 percent of all development assistance. For Sweden and Norway, the respective figures are 6.4 percent and 8.7 percent. Figures for other governments are lower than the 2.3 percent average. In each case population assistance channeled through multilateral institutions represents a higher proportion of all development assistance channeled through such sources than is the case for funds dispersed through bilateral means. The average proportion for multilateral assistance is 4.5 percent; whereas the average proportion for bilateral assistance is only 1.6 percent.

What are the implications of the above discussion of the transnational population assistance funding network for constraining
<table>
<thead>
<tr>
<th>Year</th>
<th>Total Official Development Assistance (SUS million)</th>
<th>Population Assistance (SUS million)</th>
<th>Population Assistance as Percentage of Total Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>n.a.</td>
<td>220</td>
<td>--</td>
</tr>
<tr>
<td>1972</td>
<td>8,600</td>
<td>198</td>
<td>2.3</td>
</tr>
<tr>
<td>1971</td>
<td>7,700</td>
<td>154</td>
<td>2.0</td>
</tr>
<tr>
<td>1970</td>
<td>6,800</td>
<td>125</td>
<td>1.8</td>
</tr>
<tr>
<td>1969</td>
<td>6,600</td>
<td>86</td>
<td>1.3</td>
</tr>
<tr>
<td>1968</td>
<td>6,300</td>
<td>58</td>
<td>0.9</td>
</tr>
<tr>
<td>1967</td>
<td>6,600</td>
<td>30</td>
<td>0.5</td>
</tr>
<tr>
<td>1966</td>
<td>6,000</td>
<td>34</td>
<td>0.6</td>
</tr>
<tr>
<td>1965</td>
<td>5,900</td>
<td>18</td>
<td>0.3</td>
</tr>
<tr>
<td>1964</td>
<td>6,000</td>
<td>16</td>
<td>0.3</td>
</tr>
<tr>
<td>1963</td>
<td>5,800</td>
<td>11</td>
<td>0.2</td>
</tr>
<tr>
<td>1962</td>
<td>5,400</td>
<td>5</td>
<td>0.1</td>
</tr>
<tr>
<td>1961</td>
<td>5,200</td>
<td>6</td>
<td>0.1</td>
</tr>
</tbody>
</table>


a. Figures are net totals making allowance for double-counting due to transfers between donors.

b. Excludes export credits, private investment and other commercial transfers.

c. Grants by voluntary agencies are not included for the years 1961 to 1969. In 1970 these grants amounted to $0.9 million.

d. Provisional.
<table>
<thead>
<tr>
<th>Countries</th>
<th>Multilateral</th>
<th>Bilateral</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>3.0</td>
<td>-</td>
<td>0.1</td>
</tr>
<tr>
<td>Canada</td>
<td>2.0</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Denmark</td>
<td>2.6</td>
<td>1.5</td>
<td>2.1</td>
</tr>
<tr>
<td>Finland</td>
<td>2.3</td>
<td>-</td>
<td>1.5</td>
</tr>
<tr>
<td>Germany, Federal Republic of</td>
<td>1.1</td>
<td>-</td>
<td>0.3</td>
</tr>
<tr>
<td>Japan</td>
<td>1.5</td>
<td>-</td>
<td>0.4</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2.4</td>
<td>0.2</td>
<td>1.0</td>
</tr>
<tr>
<td>Norway</td>
<td>13.1</td>
<td>4.0</td>
<td>8.7</td>
</tr>
<tr>
<td>Sweden</td>
<td>10.1</td>
<td>3.4</td>
<td>6.4</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0.6</td>
<td>-</td>
<td>0.3</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>3.0</td>
<td>0.6</td>
<td>1.1</td>
</tr>
<tr>
<td>United States</td>
<td>7.3</td>
<td>2.7</td>
<td>3.6</td>
</tr>
<tr>
<td>Total:</td>
<td>4.5</td>
<td>1.6</td>
<td>2.3</td>
</tr>
</tbody>
</table>


Note: Excluding administrative costs.
organizational behavior? At least two major constraints can be identified. The first constraint is related to the source of the funding activity. Some organizations included in the network are primary sources (primary donors) of funding. Either funded through bequeaths, philanthropic gifts, taxation, donations, membership dues or some other method of generating original funds, these organizations are not dependent on other organizations in the network for program or other financial support. The Ford Foundation and the Office of Population of USAID are examples of primary donors. Various other organizations in the network, such as The Population Council and the United Nations Fund for Population Activities, serve as intermediaries in the funding network. These organizations receive funding from either primary donors or other intermediaries. In turn, these organizations either fund other assistance organizations or may directly fund other population activities. The relative degree of financial dependence on other organizations in the population assistance network might act to limit the degree of flexibility of a particular organization in initiating policies which tend to be radically different from those approved by the primary donor.

The second major constraint which emerges from the above discussion deals with the idea of "domain consensus." Levine et al. (1963) define the domain of an organization as "the specific goals it wishes to pursue and the functions it seeks to undertake in order to achieve these goals." Thompson (1972: 178) provides a further qualification when he suggests that domain is dependent upon recognition by those who provide necessary support in the outer environment. To
the extent that an organization is dependent upon its outer environment or some aspect thereof, in order to survive or attain organizational goals, "it enters into the exchange process and domain consensus occurs." (Thompson, 1971: 178). Thus, domain consensus is an inter-organizational phenomenon. It represents the "degree to which... two organizations agree and accept each other's claims with regard to problems... covered, services offered, and population served." (Levine et al., 1963: 1191).

From Table 5 certain patterns were noted with regard to types of funding activities engaged in by specific types of organizations. It was found, for example, that bilateral government donors were predominant funders of family planning supplies, general demographic funds, demographic training funds, and research on economic and social demography. Multilateral governmental organizations were the predominant funders of demographic advisors and demographic surveys and censuses. Nongovernmental organizations also had their own domain. These organizations were the dominant funding agents of family planning research and biomedical research. It appears as though a form of "domain consensus" prevails in the transnational population assistance network. Such a system of overlapping expectations regarding areas of expertise and responsibilities imposes constraints on organizational behavior. If indeed a system of "domain consensus" does exist with reference to organizations operating in the population assistance area, then organizational flexibility to initiate new relatively costly policies or programs is limited, given budget constraints.
The above discussion has focused on those constraints which are more or less shared by all four assistance organizations. The discussion will now shift to focus more directly on aspects of organizational goals which are specific to a particular organization.

The Office of Population of the United States Agency for International Development

The Office of Population of the United States Agency for International Development (hereafter USAID) is the premier funding agency in the world in the field of population assistance. Between 1965 and 1975 USAID allocated $732 million in population assistance funds. This sum represents over 70 percent of all international donor assistance during that period (Population Reference Bureau, 1976: 203). An initial organization role of being the leader in the field should be identified as affecting organizational goals.

The Office of Population grew up within the Technical Assistance sector of USAID. In 1972 the Office of Population became a separate entity possessing a structure parallel to that of USAID proper. In addition, a separate budget has been mandated for the Office by Congress. The main task for USAID under this general mandate (Title X) was to make family planning available in less economically advanced societies. Thus, of the $732 million in population assistance funds allocated since 1965, $626 million has gone to support technical aspects of family planning. Relatively little ($106 million) in comparison has gone to support comprehensive policy development in the area of population.
The organizational role constraints for USAID are easy to identify relative to the other three organizations. The overall purpose of USAID is articulated as being the improvement of the well-being of the poor (USAID, 1976). This objective is constrained by the mandate contained within Title X above. Family planning and/or other types of fertility control programs are to be included as integral components of overall USAID assistance efforts to improve the well-being of poor peoples around the world. However, efforts at limiting population growth are seen as "only one means, albeit an important one" to achieving such a larger objective (USAID, 1976: 1).

With reference to official institutional linkages within the government bureaucracy, the Agency for International Development is an operational arm of the Department of State. Within USAID, itself, the Office of Population is located within the Bureau for Population and Humanitarian Assistance. Such a complex institutional structure poses constraints on organizational behavior. For example,

Both the Office and the Bureau collectively are subject to decisions on allocations of program funds by AID's Bureau of Program Policy and Coordination, which functions as the AID Administrator's program budget staff. Although this staff has no particular competence in operational matters for which the Office of Population is responsible, it has attempted with little success to introduce a broader "development consciousness" into the Office's programmatic thinking, and by so doing force the Office to reduce its technological emphasis. (Bergman, 1975: 78)

Such linkages often lead to bureaucratic infighting and competition.

A series of basic guidelines are employed by USAID in carrying out its mandate.
AID's assistance for the population programs of developing countries is guided by the following principles: 1) assistance is extended at the request of the recipient country or institution and as a supplement to the country's own efforts; 2) help is given only for programs in which each individual is free to choose methods of family planning which are in keeping with his or her beliefs, culture, and personal wishes; and 3) the Agency does not advocate one specific population policy for another country nor any particular method of family planning. Its aim is to provide needed family planning assistance upon request so that the people of assisted countries may have freedom to control their reproduction as they desire (Population Reference Bureau, 1976: 203).

To this list should be added the criteria of cost-effectiveness (USAID, 1976: 41). Decisions on the employment of family planning programs should be evaluated with reference to the cost-effectiveness of alternatives.

As was stated above, the USAID since 1965 has been a strong supporter of United Nations based population assistance activities. "The American initiative is based on the untested premise that activities developed and managed through the U.N. system are more tolerable than those created on a bilateral basis" (Bergman, 1975: 76). Thus, the role of USAID as a strong supporter of U.N. population activities broadens the organization's constraint set somewhat.

In review, the organizational roles and constraints which delimit the attainment of the valued outcomes of USAID can be enumerated as follows:

1) Congressional mandate;
2) desire to affect overall well-being of poor;
3) role of primary donor provides relative flexibility with regard to alternative policy selection;
4) role as premier organization and trend setter;
5) provides assistance only on request;
6) individual freedom of choice is required of programs supported;
7) will not advocate any specific policy;
8) cost-effectiveness; and
9) strong supporter of multilateral funding efforts.

While certain of the constraints (especially 3 and 4) would tend to allow a fairly broad range of alternatives to be considered during the policy selection process, other constraints are more limiting. Perhaps the most limiting constraint is the Congressional mandate. This directive narrows the range of organizational behaviors to include predominantly the support of population control programs. In addition, constraints 5 and 7 also narrow the range of satisfactory alternatives considerably. Once the range is limited, the constraint of cost-effectiveness becomes an important element in the policy selection process.

The Population Council

The Population Council was established in 1952 by John D. Rockefeller 3rd as a private, non-profit organization. Although the initial activities of the organization were concentrated in the area of demographic and biomedical research, the organization has expanded the scope of its work to include: technical assistance to family planning programs; research in demography, physiology of reproduction,

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Footnote 5: Rockefeller still serves as the chairman of the Board of Trustees of the organization.
and public health/family planning; and population related training

The Population Council's budget for 1975 was around $12 million. The main sources of funds in that year were The Ford Foundation ($3.2 million), The Rockefeller Foundation ($1.5 million), USAID ($2.3 million), and UNFPA ($0.8 million). Funds from other Rockefeller sources amounted to another $1.1 million. Thus, over two-thirds of the organization's budget came from these few sources.

Of the $12 million budget for 1975, $9.9 million went for program services (as opposed to management and general expenses). The Program Services portion of the budget is separated into three categories, corresponding to the three main operational divisions of the organization. These are Demographic Programs (23 percent), Technical Assistance (34 percent) and Biomedical Research (42 percent of the Program Services budget).

Perhaps the best way to identify additional components of the Population Council's organizational goal(s) would be to examine the "Guidelines and Principles" of the organization as proposed by the executive officers of the Council and approved by the Board of Trustees on June 9, 1976.

1. Concern with human welfare must underlie all of the Council's programmatic efforts. Thus, although a focus on population variables should be common to all its programs, its concerns must encompass all the other elements of development that may cause population to be a problem.

2. The heart of the Council should be scientific inquiry and research seeking to produce new knowledge that is useful in the solution of population problems. At the same time, it should foster utilization of existing knowledge by offering professional and technical services. These should be the council's major functions.
3. With modesty but without embarrassment, the Council should seek the role of intellectual leader, synthesist, and catalyst in the population field.

4. The Council's research should address two major fields of inquiry within the broad field of population, exploring the uncharted in each. These are policy research and research in biomedicine. It should have a center working in each field.

5. The Council should provide a wide range of technical and professional services in a framework of collaborative arrangements.

6. Enhancing its research and service activities through provision of training and capacity building by providing grants and fellowships should remain important parts of the Council's work.

7. The Council should continue as one rather than become several entities.

8. To broaden its perspectives and enhance its effectiveness, the Council's composition should become substantially more international and its decisionmaking more decentralized.

9. Efforts to strengthen, broaden, and increase the Council's financial base need to claim more attention.

10. Increased Board involvement in the Council's work is necessary and desirable.


Guideline 1 represents the formal broadening of a constraint on the scope of The Population Council's activities which had been informally expanding for some time. With reference to this guideline the report further states:

Thus, to our long-standing emphasis on population growth, we must add related concerns with economic, social, and cultural factors such as resources, income and capital, consumption, productivity, the roles and status of women, health, education, housing, employment, social security, and institutional structures; and we should pay greater attention to issues related to migration, urbanization, and mortality.
The second guideline calls for innovative research. Beyond the development of new research, however, the guideline calls for putting such knowledge to work through service activities. A constraint is placed on such service activities though, in that "service activities, including indirect costs, should be increasingly fully funded by the recipients of the service or their financiers" (The Population Council, 1976: 6).

The Population Council's role as leader is linked to providing increased attention to collaborative work with related organizations. "In providing collaborative services in the planning, implementation, and evaluation of population-related programs, we should limit ourselves to situations in which we can maintain excellence" (The Population Council, 1976: 9). Thus, while the scope of the organization's interest is expanding, constraint regarding the assurance of the quality of output is suggested.

Guideline 7 is a response to a recommendation which was considered at the 1975 Annual Meeting to divide the organization into three main divisions. Consideration of this guideline is important not as much for its substance as for the Council President's response regarding organizational role. "The Council should incorporate within itself both the worldwide functions of an international professional and service organization and the research functions of internationally oriented policy and biomedical research centers" (The Population Council, 1976: 12). This international orientation carried over into the eighth guideline, which called for more decentralized decision-making.
Extracting organizational goals from guidelines such as these can be a risky business. However, the guidelines do provide insight into organizational roles and constraints. It is thus on the basis of such "insight" that organizational goals can be discussed. Constraints which delimit the organizational goals include:

1. the role of the organization as an intermediary donor -- a vast majority of the funds come from very few sources;
2. population is to be viewed in the context of social and economic development;
3. main concern of organization is scientific inquiry and research;
4. innovation is important;
5. research findings should be put to use in the form of services;
6. the organization is to serve as intellectual leader;
7. collaboration with organizations with similar interests is encouraged; and
8. decisionmaking should be decentralized.

These numerous constraints point to a very flexible framework within which alternative policies can be tested and selected. Except for the present nature of the funding situation, the limitation of the scope of organizational activities to scientific inquiry, research and service programs, the constraints on Population Council policy alternatives are few. The organizational goals are thus flexible and broad-ranging.

Ford Foundation

The Ford Foundation is the largest grant-making philanthropic organization in the United States. In structure it is the most complex; and in scope it is one of the most diverse of such organizations. The Foundation was established in 1936 by Henry Ford and Edsel Ford.
It was not until 1950, however, that the organization became national in scope. As of 1975 the Foundation had made commitments totalling $4.8 billion. The organization provides funding for both grants and action programs. In that year the total commitment of funds going to grants and projects (not including other expenses, i.e., administrative, etc.) was $172.4 million.

The Foundation is structured into six substantive divisions under the Office of the President. These include: Division of Education and Research, Office of the Arts, Division of National Affairs, Office of Resources and the Environment, Office of Communications, and International Division. The activities of the organization are as varied as the names of the divisions suggest. The Foundation works against such "evils" as discrimination, ... hunger and malnutrition, ... inert educational processes, ... ineffective systems of criminal justice, ... inequitable school finance, ... and the vicious circle that entraps so many of our most disadvantaged citizens" (Ford Foundation, 1976a: VI-VII). Population plays an inherent role in all of these problems. As such, "the Foundation continues to give highest priority to the field of population, broadly defined, which along with agriculture has been identified by McGeorge Bundy (Ford Foundation President) ... as essential to 'the prospects of survival and development for people and societies around the world.'" (Harkavy, 1976: 1).

The Ford Foundation began its support of worldwide population activities in 1952. Although the initial supports were primarily for training and research activities through grants to universities in the
United States, since 1959 Foundation activities have spread to include reproductive sciences, contraceptive development, assistance for family planning in poorer societies, and other activities.

An examination of the Ford Foundation budget allocations for 1950-1975 (Ford Foundation, 1976b, Tables VIII and IX) provides an initial idea of past commitments to various aspects of population. Within the International Division the population sector has accounted for 13.7 percent of budget outlays between 1950 and 1975. Of the $203.8 million committed to population during that period 47 percent was spent in the area of reproductive biology, 20 percent generally in population problems, 10.6 percent in family planning, 19 percent in support of institutions (primarily The Population Council), and 2 percent on information dissemination with the remaining expenditures unclassified.

The organization's role in the area of population has been shifting. Some of the changes have been noted above.

In the coming years two major shifts in program emphasis are contemplated. The first is a relative emphasis on capacity building in the developing world together with a shift from the building of resource bases in the industrial world, without entirely abandoning the latter. The second is an increased emphasis on social science research designed to illuminate relationships between population changes on the one hand and economic and social variables on the other (Harkavy, 1976: 2).

Although the Foundation's budget has been undergoing a period of reduction, the organization role of being the leading private foundation in terms of funding population activities continues.

There appear to be relatively few constraints, other than a constricting budget and past spending patterns, limiting the flexibility
of organizational goals in the area of population. The present officials of the organization do not seem to be as concerned with projecting the image of the organization as leader in the field of population as was the case with The Population Council. This situation probably derives more from factors related to current organizational leadership than from organizational role, however.

The United Nations Fund for Population Activities

In July of 1967 a Trust Fund for Population Activities was established under the auspices of the UNO. Established as an agency funded solely by voluntary contributions, the Trust Fund suffered early administrative setbacks. In a move aimed at lessening administrative problems, the Trust Fund was placed under the control of the U.N. Development Program in 1969. At this time the Trust Fund officially became the U.N. Fund for Population Assistance (UNFPA). Under the able leadership of its Director, Rafael Salas, the UNFPA has grown to become an important action-oriented agency responsible for the coordination of almost all U.N. population activity. In December, 1972, the General Assembly placed the Fund under its own authority, with the UNDP Governing Council serving as the governing body for UNFPA. General Assembly Resolution 3019 (XXVII) also stressed the need for the UNFPA "to operate under the guidance of the Economic and Social Council, in close relationship with interested governments and with appropriate
international and national bodies, governmental and nongovernmental, interested in population activities."^6

With a budget of $80 million in 1975 the UNFPA is the leading multilateral population funding source in the world for action oriented programs. The Fund receives its financing from voluntary contributions by governments. In 1974 over 70 percent of the fund's financial resources came from contributions by five governments: Federal Republic of Germany ($5.7 million); Japan ($5 million); The Netherlands ($6 million); Sweden ($4.5 million); and the United States of America ($17.9 million). As of 1975 the cumulative pledges of the U.S. government to UNFPA totalled $77 million. This sum amounts to about 44 percent of the total pledges made to the Fund. Thus, the government of the United States is by far the leading contributor to Fund programs.

Assistance is provided primarily only on request of governments or other recipients and is based on the needs of recipients. However, the UNFPA "Tentative Work Plan" for 1972-1975 articulated the position that:

The UNFPA is not limited to acting upon specific requests from Governments or organizations, but may take the initiative to promote additional activities in accordance with its terms of reference and priorities in order to shape an integrated and comprehensive population programme of assistance to meet the urgent needs of dealing with population problems" (U.N. Doc. UNFPA/PCC/IV/4, para. 14, p. 10, 1972).

The "Tentative Work Plan" also stated that the UNFPA would provide support, upon request, to nongovernmental agencies in societies whose governments do not have official population policies, provided the government does not object (U.N. Doc. UNFPA/PCC/IV/4, para. 122, p. 48, 1972).

The exclusive right of each national government to formulate its own population policies serves as a cornerstone of United Nations population assistance activities. General Assembly Resolution 2683 (XXV) adopted in 1970, clearly acknowledges this right:

the formulation and implementation of population policies and programmes are matters falling under the internal competence of each country (25 GAOR Supp. 28, p. 55 (A/8028), 1970).

The Fund is neutral with respect to the type of assistance it provides. As such, it may fund activities either to limit or expand population growth. The UNFPA also funds a number of interregional and global programs. The distribution of funding by region in 1974 was 33 percent in Asia and the Pacific, 20 percent in Africa, 18 percent in Latin America, 12 percent for global programs and 17 percent for interregional programs. Fund supported projects are usually executed through the U.N. Secretariat, specialized agencies, nongovernmental organizations, or directly to governments. In executing programs directly the Fund uses the UNDP field structure.

The current mandate under which the UNFPA must operate was specified in Economic and Social Council Resolution 1763 (LIV)
adopted in May, 1973. Under this resolution the UNFPA has been the
proscribed aims and purposes:

(a) To build up, on an international basis, with the assistance of the competent bodies of the United Nations system, the knowledge and the capacity to respond to national, regional, interregional and global needs in the population and family planning fields; to promote coordination in planning and programming; and to cooperate with all concerned;

(b) To promote awareness, both in developed and developing countries, of the social, economic and environmental implications of national and international population problems; of the human rights aspects of family planning; and of possible strategies to deal with them, in accordance with the plans and priorities of each country;

(c) To extend systematic and sustained assistance to developing countries at their request in dealing with their population problems, such assistance to be afforded in forms and by means requested by the recipient countries and best suited to meet the individual country's needs;

(d) To play a leading role in the United Nations system in promoting population programmes, and to coordinate projects supported by the Fund. (UNFPA 1974 Report)

The constraints which delimit these aims appear to be somewhat more restrictive than those confronting the other organizations. Even though the governing responsibility for the UNFPA is located in the Governing Council of the UNDP, the Fund is not responsible for providing assistance for general developmental programs. The UNFPA is exclusively a special purpose population fund with the aims and purposes specified in ECOSOC Resolution 1763 (LIV).

The UNFPA is financed by the voluntary contributions of governments in the context of a large intergovernmental political institution. Most of these contributions come from a very few sources.
Assistance is provided primarily only on the request of the recipient. In addition, the UNFPA is supposed to be neutral regarding the particular type of assistance granted.

Summary

In this chapter the organizational goals of four selected assistance granting organizations have been identified. The value premises of these organizations, regarding the desired states of affairs in the organizations' environments, were examined in light of factors which constrain the organizations' abilities to affect such conditions. The clarification of organizational goals served to fulfill one of the basic objectives of this study. The general trends at regional and global levels toward or away from the realization of such goals is the focus of the next chapter.
CHAPTER III

POPULATION GROWTH AND SOCIAL AND ECONOMIC DEVELOPMENT

Introduction

In the above chapter organizational goals were clarified. However, knowing desired states of affairs and knowing constraints affecting organizations' abilities to bring about those states of affairs does not provide sufficient information upon which to base sound decision-making. Another critical element is knowledge of the trends to or away from the realization of organizational goals. The present chapter examines such trends.

Numerous writers (including Lester Brown, 1972; Falk, 1971; and Hardin, 1972) have for some time been popularizing the need to consider most of humankind's problems as an interdependent network. The solution of one particular "problem" has implications for the solution of the rest. In very general terms it is helpful to speak of four clusters of issue-areas: population growth and change, food, poverty (the distribution of resources and wealth and consumption patterns of those resources), and environmental decay and resource wastage. These clusters will be discussed in the following two subsections. First, population growth and change will be examined in historical perspective. Then, the nexes of conditions interrelating the other three clusters and the interrelationships among those three and population growth and change will be discussed.
The chapter concludes with a discussion of governmental attempts in developing regions to deal with population/development issues. In that section the present status of population policies in development plans of developing societies' governments will also be examined.

Population Growth and Change in Historical Context

The continually increasing rates of growth of the world's population, especially in the last two decades, has by almost any standard been phenomenal. The average annual rate of population growth throughout most of man's existence, although far from steady, was almost zero. However, by the middle of the Eighteenth Century the rate of growth had accelerated to about 0.3 percent or 3,000 per million. By 1950, the rate of growth had increased to over 1.1 percent or 11,000 per million. Within the next 20 years the world saw a doubling of the rate of growth to over 2.0 percent. Thus, with the coming of the Twentieth Century came an extraordinary increase in the rates by which the human population on earth grows.

Global demographic statistics can be quite misleading, as Table 9 illustrates. There is a wide difference between the average rates of growth in the developed world (0.8) and the developing world (2.5). This statement does not mean to imply, however, that substantial diversity does not exist within these two regions. As the table illustrates, considerable diversity does exist. Generally speaking, the region with the highest average population growth rates is tropical Latin America. The population of Mexico, with a rate of growth of 3.5 percent, is projected to double in about 20 years. In 1972, two societies, China and India, contributed nearly 40 percent.
### TABLE 19

<table>
<thead>
<tr>
<th>Area</th>
<th>Population (in millions)</th>
<th>Crude birth rate</th>
<th>Crude death rate</th>
<th>Annual rate of natural increase (in percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World total</td>
<td>3.660</td>
<td>33</td>
<td>13</td>
<td>2.0</td>
</tr>
<tr>
<td>Developed world</td>
<td>1.120</td>
<td>17</td>
<td>9</td>
<td>0.8</td>
</tr>
<tr>
<td>Developing world</td>
<td>2.740</td>
<td>39</td>
<td>14</td>
<td>2.5</td>
</tr>
<tr>
<td>Africa</td>
<td>375</td>
<td>46</td>
<td>19</td>
<td>2.7</td>
</tr>
<tr>
<td>Asia (excluding Japan)</td>
<td>2,100</td>
<td>38</td>
<td>14</td>
<td>2.4</td>
</tr>
<tr>
<td>Latin America (tropical)</td>
<td>265</td>
<td>38</td>
<td>8</td>
<td>3.0</td>
</tr>
<tr>
<td>United States</td>
<td>210</td>
<td>15</td>
<td>9</td>
<td>0.6</td>
</tr>
<tr>
<td>Japan</td>
<td>108</td>
<td>19</td>
<td>7</td>
<td>1.2</td>
</tr>
<tr>
<td>Europe</td>
<td>472</td>
<td>16</td>
<td>11</td>
<td>0.3</td>
</tr>
<tr>
<td>Soviet Union</td>
<td>250</td>
<td>18</td>
<td>8</td>
<td>1.0</td>
</tr>
<tr>
<td>Other (Canada, Australia, New Zealand, temperate Latin America)</td>
<td>80</td>
<td>22</td>
<td>8</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Source: Berelson, 1974: 3.
However, because of their relatively large sizes, two societies -- China and India -- contributed nearly 40 percent of the annual world population increase in 1972. A vast majority of the world's population is concentrated in the developing areas. In 1950, 70 percent of the world's peoples were located in Latin America, Africa, and Asia and Oceania. At present growth rates that proportion would become over 80 percent by the year 2000.

Census taking is an activity of fairly recent vintage. It was not until 1749 that the first total national population census was completed in Sweden. Thereafter, nearly a half century passed before any other government attempted a similar endeavor. In 1790 the United States of America conducted its first decennial census. Then, France and England undertook to enumerate their national populations in 1801.

During 1855-1864, population censuses were taken in fifty-one countries and covered about 17 percent of the world's population. Censuses taken in 1945-1954, which included that of China, counted about 75 percent of the world; in 1955-1964, world coverage was about .67 percent, when 202 countries had censuses... (United Nations, 1973: 32).

Still in the mid-1970's, however, reliable census data for many areas of the world is not available.

To compensate for such shortcomings, numerous individuals have attempted to fill in the missing gaps with various estimation procedures. Two of the earliest and best received estimates of regional and global populations were those of Wilcox (1940) and of Carr-Saunders (1936). Their estimates for the period 1750-1900 in fifty
year intervals, along with additional estimates provided by the United Nations (1973), appear in Table 10.¹

The data in Table 10 indicate that globally until about the last half century population increased at a fairly steady but slow pace. Within the last 50 years marked acceleration has taken place. Regionally, substantial fluctuation has occurred in growth trends. "Decline was registered for North America, stability for Europe, fluctuations for the U.S.S.R. and China, while for the remainder of Asia and for Latin America and Africa a reflection of the steady overall increase is found" (United Nations, 1973: 31).

Latin America has registered the fastest rate of population growth of any region in the world. Within this region Brazil's population growth rate has consistently outstripped all others. In Asia the population trends of China, India and Pakistan have predominated over the region. In 1965 these three societies accounted for 70 percent of the region's population, and for 40 percent of the entire world's total human population (United Nations, 1973: 28).

¹Admittedly, these estimates, representing over 200 years of population growth and change, are rough, at best. However, when compared with similar population estimation attempts the Carr-Saunders/Wilcox averages reported here are fairly conservative. Geographical aggregation and the broad temporal scale employed assuredly mask numerous fluctuations which are more localized and of shorter duration.
### TABLE 10

**ESTIMATES OF WORLD POPULATION BY REGIONS: 1650 TO 1969**

<table>
<thead>
<tr>
<th>Source of estimate and year</th>
<th>World total</th>
<th>INDUSTRIALIZED REGIONS</th>
<th>DEVELOPING REGIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Europe and USSR</td>
<td>Northern America</td>
</tr>
<tr>
<td>A. ESTIMATED POPULATION (MILLIONS) United Nations estimates</td>
<td>1650</td>
<td>3052</td>
<td>543</td>
</tr>
<tr>
<td></td>
<td>1800</td>
<td>3008</td>
<td>657</td>
</tr>
<tr>
<td></td>
<td>1850</td>
<td>2239</td>
<td>720</td>
</tr>
<tr>
<td></td>
<td>1900</td>
<td>2243</td>
<td>720</td>
</tr>
<tr>
<td></td>
<td>1950</td>
<td>2215</td>
<td>671</td>
</tr>
<tr>
<td></td>
<td>1975</td>
<td>2111</td>
<td>613</td>
</tr>
<tr>
<td>Carr-Saunders/Wilcox estimates</td>
<td>1500</td>
<td>1590</td>
<td>510</td>
</tr>
<tr>
<td></td>
<td>1850</td>
<td>1131</td>
<td>302</td>
</tr>
<tr>
<td></td>
<td>1800</td>
<td>912</td>
<td>209</td>
</tr>
<tr>
<td></td>
<td>1750</td>
<td>711</td>
<td>147</td>
</tr>
<tr>
<td></td>
<td>1700</td>
<td>607</td>
<td>106</td>
</tr>
<tr>
<td>B. IMPLIED AVERAGE ANNUAL RATES OF GROWTH</td>
<td>1950-1960</td>
<td>1.83</td>
<td>1.26</td>
</tr>
<tr>
<td></td>
<td>1940-1950</td>
<td>1.10</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>1930-1940</td>
<td>1.11</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>1920-1930</td>
<td>1.07</td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td>1910-1920</td>
<td>0.69</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>1900-1910</td>
<td>0.68</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td>1890-1850</td>
<td>0.43</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>1850-1800</td>
<td>0.50</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>1800-1750</td>
<td>0.34</td>
<td>0.33</td>
</tr>
</tbody>
</table>

**SOURCE:** Data for 1920-1969 from United Nations, *Demographic Yearbook*. Data for 1650-1900 are based on average of estimates by Carr-Saunders/Wilcox, as modified by United Nations and reported in *The Determinants and Consequences of Population Trends*.

Internal (urban/rural) distributions of populations also vary greatly around the world. In 1965, the percentage of global population living in urban districts was approximately 35 percent. A vast difference existed, however, between more developed and less developed regions. In more developed regions the percentage of urban population was 61; while in less developed regions the percentage was 23 (United Nations, 1973: 185).

Age distributions also vary markedly between more developed and developing regions. Table II presents estimated age distributions and dependency ratios of the populations of the two aggregated areas of the world for 1965.

TABLE II


<table>
<thead>
<tr>
<th>Major areas and regions</th>
<th>Percentage distribution by age</th>
<th>Dependency ratio (number of persons in dependent age groups per 100 aged 15-64 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Under 15 years</td>
<td>15-64 years</td>
</tr>
<tr>
<td>World total</td>
<td>37.4</td>
<td>57.6</td>
</tr>
<tr>
<td>Developing regions</td>
<td>41.6</td>
<td>55.1</td>
</tr>
<tr>
<td>More developed regions</td>
<td>28.1</td>
<td>63.0</td>
</tr>
</tbody>
</table>


On the average, about 42 percent of the populations in developing

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2 "Urban" defined as that part of populations specified as living in "densely inhabited districts" according to the censuses.
regions are under 15 years of age. For the more developed regions
the figure is substantially lower, 28 percent. Not only do the
developing regions tend to have much higher proportions of children,
but also much lower proportions of old people than do more developed
regions. The resulting population age structures for societies in
developing regions thus tend to be considerably more pyramidal. By
representing various societies' age structures graphically by histo-
grams, it is possible to visually illustrate this point. The relative
frequencies of each sex at different age levels are charted on a graph.
Such histograms, population "pyramids," for six societies (1965),
three developing -- Philippines, Mexico, and Singapore -- and three
more developed -- Japan, Sweden, and the United Kingdom -- are illus-
trated in Figure 4. The relative proportion of the so-called working
ages (15-64 years) is much greater in the three more developed
societies.

Concentrating in more detail on the under 15 years of age grouping
reveals some interesting trends for the period 1950-1965. During this
decade and a half the pre-school population (0-4 years) of the
developing regions increased by 37.5 percent (United Nations, 1973: 286).
The comparable trend for the more developed region yields only a 12
percent increase. For the school-age population (5-14 years) in the
developing societies the increase amounted to 45 percent, as compared
to 27.4 percent in the more developed regions.
FIGURE 4

AGE PYRAMIDS FOR SIX SELECTED COUNTRIES, 1965

Such skewed population distributions have numerous implications for future conditions in these developing regions. One such implication relates to the large dependency ratios prevalent in these areas. The dependency ratios appearing in Table 11 depict the ratio of persons in non-working (dependent under 15 years and over 64 years) age groups to those of working age. Even though the percentage of population falling in the 65 years and over category is greater in the more developed societies, the total dependency ratio of the developing regions is far greater (81.3 as compared to 58.8 in more developed societies). With nearly half of the population in these regions dependent on the other half (55 percent) for support the amount of resources (including financial resources) available for such purposes as savings investment in these areas is greatly restricted.

A second implication relates to the labor market. As time passes the number of individuals entering the so-called working age (15-64 years) category outpaces the number of individuals leaving the labor market (all else being equal), placing increasing demands on the labor market. During the decade and a half in question, the working-age population in these developing societies increased by 36.3 percent. As will be discussed later, unemployment and underemployment levels also tend to increase.

The increase in the number of females of reproductive age follows closely the trends described above for other groupings. On the average, in developing societies this group underwent a 36 percent increase between 1950 and 1965, a growth rate three times that which occurred
in more developed regions. In Latin America the numbers of women in
the fertile age group increased by 45 percent, in Africa by 40 percent,
and in Asia by about 33 percent (United Nations, 1973: 288). Such
increases provide a powerful momentum for increasing the absolute
number of births.

As Bernard Berelson, President Emeritus of the Population Council,
has explained, the momentum of population growth is so powerful that
even if the rate of growth fell immediately to the "replacement
level" — an average of two children per family reaching maturity —
world population would increase by over half again. It is argued that
such a built-in momentum is the result of two major factors: the age
distribution (structure) of the world's population and the deeply in­
grained social and economic forces which encourage high fertility. In
general, the developing societies have particularly young age compo­
ositions. Similarly, it is in the developing societies that we generally
find socio-economic forces which inhibit low fertility. Thus, the
resulting momentum in those societies, given the assumption above,
would be much greater (two-and-one-half times greater) than that of
the developed societies. "Moreover, since the current population of
developing countries is about twice as large as that of developed
countries, the number of additional persons implied by this greater
momentum would be nearly six times greater (Berelson, 1974: 12).

---

3 This assumption is, of course, overly optimistic and unreal,
short of major world disaster.
Many individuals argue, however, that rapid population growth is, in itself, not necessarily a problem. Indeed, in Chapter II it was discovered that organizational goals regarding population assistance are not held in isolation of larger social and economic development objectives.

It is the relationship between population growth and change and social and economic conditions that creates such great interest and controversy. Paragraph one of the World Population Plan of Action clearly illustrates this point.

The explicit aim of the World Population Plan of Action is to help coordinate population trends and the trends of economic and social development. Consequently, the Plan of Action must be considered as an important component of the system of international strategies and as an instrument of the international community for the promotion of economic development, quality of life, human rights and fundamental freedoms.

Berelson (1974: 16) has attempted to communicate the concern over population growth and change in a somewhat different manner.

The situation is problematic only insofar as it has serious consequences for human values. Men want the goods of life — a higher standard of living, better health, more education, a harmonious environment... What does the population situation have to do with the chances of realizing such goals for the current generation and the generations ahead?

Thus, to understand the significance of population growth and change for policy decisionmaking, attention must spread beyond the consideration of demographic characteristics.

The rapid growth of human populations is so closely related to numerous other factors — growing scarcity of food, water, land, fertilizer, energy, and so forth — that to view this problem in
isolation seems suspect. Indeed, entities attempting to cope with any of these many elements would be wise to consider (to some degree) all of them. Borrowing the term from Churchman (1971:54), Anderson (1974: 4) has introduced to the study of the population problem the idea of "design inseparability." Simply put, the idea of design inseparability states that the optimal method of solution of one problem depends on how the other problems are solved.

The ability of the world to support a given level of population depends upon (and cannot be separated from) the level at which individuals consume. The level at which a population consumes renewable resources (e.g., water, air, and food) depends upon the ability of the ecological and agricultural systems to renew those resources. The level at which nonrenewable resources (e.g., fossil fuels, minerals, and metals) are consumed depends upon their supply in nature and the rate at which they can be extracted and recycled. Population cannot be considered as separate from food, nor can either food or population be considered as separate from the environment (Anderson, 1974: 4)

The specification of the nature of the relationships between the various elements specified above (population, renewable resources, etc.) is not of key importance at this time. The point to be made is that these elements exist in nature in dynamic interdependence. As Garrett Hardin points out in his book, Exploring New Ethics for Survival: The Voyage of the Spaceship Beagle (1972), when attempting to solve problems related to the quality of life in nature, you cannot focus on just one element in nature. This realization is generally shared by individuals possessing competing images of the role of population growth in social and economic development. Thus, trends in population growth and change must not be viewed solely in isolation of these other factors.
Various characteristics of human population growth and change around the globe were illustrated above. It was shown that in more recent times, especially since 1950, substantial differences in growth and distribution patterns exist between developing societies and relatively more developed societies. In general, the rates of growth of populations in the less economically advanced societies of the world far out-pace the rates found in the richer societies. Similarly, wealth, resources, technology, food and other elements are distributed quite unequally. Unfortunately for a majority of the world's populations, many of these factors, and the capability of utilizing these factors for solving humankind's most pressing problems, are concentrated in the hands of the relatively well-to-do minority.

Table 12 presents data on the distribution of population and income according to levels of per capita income for 70 countries in 1949. Over 62 percent of total world income is located in countries comprising only 15 percent of the world's total population. At the same time, societies comprising over 50 percent (per capita income of $100 or less) of the world's population share only 9.0 percent of total world income.
**TABLE 12**

DISTRIBUTION OF POPULATION AND INCOME ACCORDING TO LEVELS OF "PER CAPITA" INCOME, SEVENTY COUNTRIES, 1949

<table>
<thead>
<tr>
<th>Per capita income (US dollars)</th>
<th>Population</th>
<th>Total Income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Millions</td>
<td>Percentage distribution</td>
</tr>
<tr>
<td>Total</td>
<td>2,080</td>
<td>100</td>
</tr>
<tr>
<td>Less than 50</td>
<td>651</td>
<td>31</td>
</tr>
<tr>
<td>50 to 100</td>
<td>477</td>
<td>23</td>
</tr>
<tr>
<td>100 to 200</td>
<td>253</td>
<td>12</td>
</tr>
<tr>
<td>200 to 400</td>
<td>394</td>
<td>19</td>
</tr>
<tr>
<td>400 and over</td>
<td>305</td>
<td>15</td>
</tr>
</tbody>
</table>


Examining income distributions regionally provides a similar picture of gross inequality. In 1961 North America, Europe and Oceania, which consisted of less than 29 percent of the world's total population, accounted for over 80 percent of total world income. Thus, the regions of Latin America, Asia (including Japan), and Africa, while accounting for over 70 percent of the world's population, registered under 20 percent of the world's total income. Table 13 illustrates these disparities.

What is perhaps most alarming is that this gap is growing larger. Table 14 illustrates this point employing data for 1938 and 1961. While relative per capita income in North America, Oceania and Europe increased considerably between these years, indices of such income levels for all three developing regions declined.
### TABLE 13

PERCENTAGE DISTRIBUTION OF WORLD POPULATION AND INCOME BY REGIONS, 1938-1961

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage of total population</th>
<th>Percentage of total income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1938</td>
<td>1949</td>
</tr>
<tr>
<td>World</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>North America and Oceania</td>
<td>7.1</td>
<td>7.5</td>
</tr>
<tr>
<td>Europe (including the USSR)</td>
<td>26.4</td>
<td>24.8</td>
</tr>
<tr>
<td>Latin America</td>
<td>6.0</td>
<td>6.6</td>
</tr>
<tr>
<td>Asia</td>
<td>53.2</td>
<td>52.4</td>
</tr>
<tr>
<td>Africa</td>
<td>7.3</td>
<td>8.6</td>
</tr>
</tbody>
</table>


### TABLE 14

RELATIVE "PER CAPITA" INCOME BY REGIONS, 1938 and 1961

<table>
<thead>
<tr>
<th>Region</th>
<th>1938</th>
<th>1961</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>North America and Oceania</td>
<td>419</td>
<td>542</td>
</tr>
<tr>
<td>Europe (including Asiatic USSR)</td>
<td>177</td>
<td>181</td>
</tr>
<tr>
<td>Latin America</td>
<td>71</td>
<td>69</td>
</tr>
<tr>
<td>Asia</td>
<td>33</td>
<td>23</td>
</tr>
<tr>
<td>Africa</td>
<td>32</td>
<td>22</td>
</tr>
</tbody>
</table>

Source: Extracted from United Nations, 1973: 524,
In his book, *This Endangered Planet*, Richard Falk tells us that an estimated two-thirds to three-quarters of the world's population is undernourished. Yet we find that between 1961 and 1973 in the more developed countries per capita food production increased considerably. Figure 5 illustrates the resulting 15 percent increase per capita in food production in the developed societies.

In the less developed societies, however, the picture is not quite as pleasant. Even though total food production expanded by about 30 percent, these increases were almost completely wiped out by increases in population. Figure 6 illustrates this lack of improvement in per capita food production.

Although viewing food production trends at such an aggregated level does provide a concise picture of the inequalities existing around the world, such averages mask the considerable variations that exist across and within regions. Table 15 illustrates distributions of growth rates of total and per capita food productions for societies within different regions for which data was available for the period 1956-1958 to 1966-1968. Most of the more developed societies experienced annual growth rates of total food production of 1.5 percent or above and annual growth rates of per capita food production 1.0 percent or above. However, in the developing regions over two-fifths of the societies experienced annual growth rates of total food production of
Figure 5. Total and Per Capita Food Production in More Developed Countries, 1961-73

Source: U.S. Department of Agriculture.

Figure 6. Total and Per Capita Food Production in Less Developed Countries, 1961-73

TABLE 15

Distribution of countries according to growth rates of total and per capita food production, for major areas and regions of the world, 1956-1958 to 1966-1968

<table>
<thead>
<tr>
<th>Major areas and regions</th>
<th>Number of countries</th>
<th>Total food production</th>
<th>Per capita food production</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Less than 0</td>
<td>0.5-1.5</td>
</tr>
<tr>
<td>More developed regions ..........</td>
<td>26</td>
<td>—</td>
<td>4</td>
</tr>
<tr>
<td>Western Europe ..................</td>
<td>19</td>
<td>—</td>
<td>2</td>
</tr>
<tr>
<td>North America and Oceania .....</td>
<td>4</td>
<td>—</td>
<td>2</td>
</tr>
<tr>
<td>Other more developed countries</td>
<td>3</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Developing regions .............</td>
<td>75</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>Africa .........................</td>
<td>26</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Far East ........................</td>
<td>14</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Near East ........................</td>
<td>12</td>
<td>—</td>
<td>3</td>
</tr>
<tr>
<td>Latin America ..................</td>
<td>23</td>
<td>—</td>
<td>6</td>
</tr>
</tbody>
</table>

aJapan, South Africa and Israel.  bExcluding China.


under 1.5 percent. Also, over two-fifths of these societies (32) suffered per capita food production declines during this period.

Considering only per capita food production growth rates, the number of societies in the Near East suffering food production declines was greater (50 percent) than any other region. An additional third of the Near Eastern societies had per capita food production rates greater than 0.0, yet less than 1.0 percent. A similar pattern is apparent in Latin America. Nearly 83 percent of the societies in this region experienced per capita food production growth rates of less than 1.0 percent. Although, in general, the food production patterns which occurred in societies in other developing regions were somewhat less discouraging, they are only marginally so.
Furthermore, given the growing scarcity of the basic inputs of land, water, energy, and fertilizer, it is becoming increasingly unlikely that the less developed countries will be able to improve diets significantly in the foreseeable future... Indeed, it appears very possible that per capita food production will even decline in the years ahead (Brown, 1974a: 38).

The food production situation appears even more dire when viewed in the context of societies' abilities to meet minimum daily food requirements. Table 16 presents data on trends and levels of per capita food supplies in terms of calories and total and animal proteins by region since before the Second World War and until the mid-1960's. In general, in terms of both calories and proteins, substantial inequalities exist between developing societies and more developed societies. These disparities in food supplies have increased considerably during this time. The most striking gap between the developing and the more developed societies exists in reference to daily

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Calorie</td>
<td>Total protein (grams)</td>
<td>Animal protein (grams)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>2,420</td>
<td>2,240</td>
<td>2,420</td>
<td>2,390</td>
<td>68</td>
<td>64</td>
<td>68</td>
<td>65</td>
</tr>
<tr>
<td>More developed regions</td>
<td>2,920</td>
<td>2,850</td>
<td>3,010</td>
<td>3,000</td>
<td>87</td>
<td>87</td>
<td>89</td>
<td>90</td>
</tr>
<tr>
<td>Europe (including USSR)</td>
<td>2,510</td>
<td>2,710</td>
<td>2,990</td>
<td>3,070</td>
<td>87</td>
<td>84</td>
<td>89</td>
<td>88</td>
</tr>
<tr>
<td>North America</td>
<td>3,150</td>
<td>3,110</td>
<td>3,130</td>
<td>3,130</td>
<td>88</td>
<td>94</td>
<td>89</td>
<td>93</td>
</tr>
<tr>
<td>Oceania</td>
<td>3,260</td>
<td>3,250</td>
<td>3,210</td>
<td>3,220</td>
<td>96</td>
<td>98</td>
<td>97</td>
<td>95</td>
</tr>
<tr>
<td>Developing regions</td>
<td>2,130</td>
<td>2,000</td>
<td>2,140</td>
<td>2,140</td>
<td>60</td>
<td>55</td>
<td>59</td>
<td>56</td>
</tr>
<tr>
<td>Far East</td>
<td>2,160</td>
<td>2,100</td>
<td>2,050</td>
<td>2,060</td>
<td>60</td>
<td>55</td>
<td>57</td>
<td>54</td>
</tr>
<tr>
<td>Near East</td>
<td>2,270</td>
<td>2,160</td>
<td>2,130</td>
<td>2,400</td>
<td>73</td>
<td>68</td>
<td>74</td>
<td>69</td>
</tr>
<tr>
<td>Africa</td>
<td>2,190</td>
<td>2,110</td>
<td>2,190</td>
<td>2,190</td>
<td>60</td>
<td>55</td>
<td>59</td>
<td>56</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>2,170</td>
<td>2,100</td>
<td>2,470</td>
<td>2,490</td>
<td>62</td>
<td>59</td>
<td>62</td>
<td>66</td>
</tr>
</tbody>
</table>

Mostly 1934-1938.

Source: Estimates provided by the Food and Agriculture Organization of the United Nations. These estimates are derived from food balance-sheets for over 80 countries and covering nearly 95 percent of the world's population. United Nations, 1973: 409.
per capita animal protein supplies. In developing societies the supply of such protein is estimated at about 11 grammes per person; whereas, in more developed societies the corresponding estimate is 46 grammes.

An examination of food supplies in themselves does not really provide the reader with sufficient data with which to evaluate societies' abilities to meet minimum daily food requirements.

There exists among nutrition experts a measure of agreement on calorie requirements under different conditions, but requirements for essential nutrients do not enjoy a comparable degree of unanimity. Thus, whereas undernutrition can be evaluated by comparing calorie intakes with requirements, malnutrition does not lend itself to this simple type of evaluation because of the many factors involved and the difficulties in establishing requirements (United Nations, 1973: 409-410).

Table 17 presents estimates of per capita supplies of calories in relation to requirements for 1963-1965. The table indicates that, on the average, world-wide supplies of calories were sufficient to meet requirements. However, substantial disparities exist between developing and more developed societies. Whereas in the more developed regions calorie supplies exceed estimated requirements by 19 percent, in the developing societies, on average, supplies fell seven percent short of estimated requirements.
TABLE 17

CALORIE SUPPLIES AND REQUIREMENTS, FOR MAJOR AREAS AND REGIONS OF THE WORLD, 1963-1965

<table>
<thead>
<tr>
<th>Major area and region</th>
<th>Calories (per capita per day)</th>
<th>Calories supplied as percentage of requirements</th>
<th>Percentage of calories derived from cereals, starches and sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>2,390</td>
<td>100</td>
<td>70</td>
</tr>
<tr>
<td>More developed regions</td>
<td>2,590</td>
<td>119</td>
<td>54</td>
</tr>
<tr>
<td>Europe (including USSR)</td>
<td>2,570</td>
<td>119</td>
<td>59</td>
</tr>
<tr>
<td>North America</td>
<td>2,640</td>
<td>119</td>
<td>40</td>
</tr>
<tr>
<td>Oceania</td>
<td>2,660</td>
<td>121</td>
<td>46</td>
</tr>
<tr>
<td>Developing regions</td>
<td>2,140</td>
<td>93</td>
<td>78</td>
</tr>
<tr>
<td>Far East</td>
<td>2,000</td>
<td>90</td>
<td>80</td>
</tr>
<tr>
<td>Near East</td>
<td>2,400</td>
<td>98</td>
<td>73</td>
</tr>
<tr>
<td>Africa</td>
<td>2,190</td>
<td>94</td>
<td>79</td>
</tr>
<tr>
<td>Latin America</td>
<td>2,490</td>
<td>105</td>
<td>66</td>
</tr>
</tbody>
</table>


The reader should be cautioned, however, as to the uncertainty involved in the data present in the food supplies and requirements tables. Precise regional, national and local data are not available for most peoples of the world. Also, important differences exist within societies: between urban and rural populations, age groups, sexes, and socio-economic classes. Indeed, substantial disparities existing within developing societies complicate the picture.

Another major global concern is the depletion of the resource base, land. According to a study by Doane (1957), there has been a net decrease in the amount of available agricultural land. For the most part, this decrease has resulted from three main factors: deforestation, erosion, and agricultural malpractice. Doane calculated that in 1882 approximately 45.4 percent of the earth’s surface was covered with forested areas. By 1952, 70 years later, this figure had decreased to 29.6 percent. This decrease in forested areas was primarily the result
of the increase in: 1) desert areas and wastelands; 2) cultivated land; and 3) land physically occupied by humankind and humankind's structures. From 1882 to 1952, desert lands and wastelands increased from 9.4 percent to 23.3 percent of the total land area of the world. To a lesser degree cultivated land also increased, from 21.0 percent to 29.2 percent of the total land area of the globe. Similarly, land occupied by urban areas, housing, industry and infrastructures increased from 7.7 percent to 14.6 percent during this 70-year period (Doane, 1957: 24).

In many parts of the less developed world (particularly in Asia, the Middle East, North Africa, East Africa, Central America and the Andean countries) the per capita decline of arable land has become so great that many persons cannot earn livings, given available technologies (Brown, 1974b: 105). Thus, considerable pockets of unemployed and underemployed persons are developing in the rural areas of these societies. Like the per capita food situation, future prospects for greater employment seem bleak.

Although the employment situation in most less developed countries has not been examined carefully, a close look was taken at Colombia by the International Labour Organization (ILO). In a 500-page report the ILO reported that:

At a conservative estimate one-half million Colombians, out of an active urban labor force of some three million, are seeking work, but are unable to find it. Probably as many again would like to work, but are not currently looking for it, having given up in frustration or having not even started to look with any seriousness, deterred by the knowledge that their chance of finding a job is slim (International Labour Office, 1970).

It is estimated that in Pakistan, Bangladesh, Ceylon, Malaysia, the Philippines, and Indonesia unemployment exceeds 15 percent. In
India, where an estimated 100,000 individuals enter the labor force each week, the unemployment situation is even more dire (Brown, 1974b: 107).

In poorer societies such massive rural unemployment has led to increases in the traditional rural to urban migration. Unfortunately, however, urban facilities and social institutions are ill-equipped to cope with such influxes. Thus, massive "squatter" settlements with dangerously poor sanitation have plagued urban areas. Housing in these settlements usually consists of tin, wood, or cardboard shacks. This fact is only symptomatic of the large housing problem in the less developed regions, however. Stanley Johnson (1973) has estimated that more than one billion new housing units will be required by the end of the century to keep up with current population growth rates and to replace existing ones. At current construction rates in these regions, however, only about 125,000 units will have been built by that time.

Similar trends, although not so overwhelming, are apparent in education. Although important strides have been taken in increasing the number of children receiving an elementary education in less developed societies, during the decade 1960-70, there were about 70 million more illiterates (Johnson, 1973: 51).

In the developing regions of the world levels of energy consumption (both total and per capita) have been increasing modestly (see Table 18). However, even though average annual rates of increase of both total and per capita energy consumption in developing regions...
TABLE 18

ENERGY CONSUMPTION FOR MAJOR AREAS OF THE WORLD, 1950 and 1968

(Weights in coal equivalent)

<table>
<thead>
<tr>
<th>Major areas</th>
<th>1950</th>
<th>1968</th>
<th>Average annual rate of increase 1950-1968 (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (million tons)</td>
<td>2,518.8</td>
<td>6,016.1</td>
<td>5.0</td>
</tr>
<tr>
<td>Per capita (kg)</td>
<td>1,054</td>
<td>1,727</td>
<td>2.8</td>
</tr>
<tr>
<td>Developed private enterprise economies&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (million tons)</td>
<td>1,866.8</td>
<td>3,774.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Per capita (kg)</td>
<td>3,334</td>
<td>5,436</td>
<td>2.8</td>
</tr>
<tr>
<td>Centrally planned economies&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (million tons)</td>
<td>512.5</td>
<td>1,744.7</td>
<td>7.1</td>
</tr>
<tr>
<td>Per capita (kg)</td>
<td>598</td>
<td>1,550</td>
<td>5.4</td>
</tr>
<tr>
<td>European area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (million tons)</td>
<td>474.4</td>
<td>1,394.0</td>
<td>6.2</td>
</tr>
<tr>
<td>Per capita (kg)</td>
<td>1,659</td>
<td>3,850</td>
<td>4.8</td>
</tr>
<tr>
<td>Asian area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (million tons)</td>
<td>38.1&lt;sup&gt;c&lt;/sup&gt;</td>
<td>350.4</td>
<td>13.1</td>
</tr>
<tr>
<td>Per capita (kg)</td>
<td>66&lt;sup&gt;c&lt;/sup&gt;</td>
<td>458</td>
<td>11.4</td>
</tr>
<tr>
<td>Developing countries&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (million tons)</td>
<td>139.5</td>
<td>496.9</td>
<td>7.5</td>
</tr>
<tr>
<td>Per capita (kg)</td>
<td>128</td>
<td>299</td>
<td>4.8</td>
</tr>
</tbody>
</table>


<sup>a</sup> Includes North America, Western Europe, Japan, South Africa and Oceania.

<sup>b</sup> Includes Eastern European countries, the USSR, China, Mongolia, North Korea and North Viet-Nam.

<sup>c</sup> Estimate for China and North Korea only. It should be noted that 1950 was an abnormal year for China and a more appropriate base year might be the first year of the first Five-Year Plan, namely, 1953-1957.

<sup>d</sup> Developing countries comprise countries in the Americas, excluding North America; countries in Africa, excluding South Africa; and countries in Asia, excluding Japan and the centrally planned economies of Asia, listed in footnote<sup>a</sup> above.

have outpaced those of more developed private enterprise economies, the absolute gap between the two has substantially widened. The level of per capita energy consumption in the developing regions remained extremely low in comparison to the more developed regions of the world. In 1968 per capita energy consumption was only 299 kilogrammes of coal equivalent in developing regions. In the same year per capita consumption levels for developed private enterprise economies and European centrally planned economies were 5,436 and 3,850 kilogrammes respectively. The low average levels of energy consumption in developing regions is further complicated by disparities between urban and rural areas. Inequalities and low levels of energy consumption have important implications for attempts to cope with perceived problems in these regions. "The use of energy is a key to the supply of food, to physical comfort, and to the enhancement of the quality of life beyond the essentials necessary for survival" (United Nations, 1973: 383).

By most standards the future of many areas in the developing world does not seem bright. Most governmental leaders around the world share at least some concern over these areas. Even though Third World leaders emphasize the necessity of maintaining national control over policies aimed at resolving domestic ills, there appears to be general consensus that the ultimate resolution of the difficulties depends on international cooperation and/or changes in the structures of the international system. Many individuals in the relatively richer societies share this belief. Thus, population and development
assistance activities are being undertaken by various organizations in the richer societies.

This study is being undertaken with the hope of ultimately providing some guidance to decisionmakers within such assistance granting organizations. Given the complex relationships existing among the various elements in national, regional and global systems, what policy actions will contribute toward the attainment of these decisionmakers' valued outcomes?

**Population Policies in Development Planning**

In the preceding overview of social trends in various regions of the world the fact that great disparities exist between and within these regions has become apparent. Over two-thirds of the world's peoples live under conditions considered quite intolerable by the other third. Undernourishment, underemployment, unemployment, housing shortages, illiteracy are just a few of the structural problems confronting these peoples. Another structural element -- rapid population growth -- co-occurs with many of these other factors in much of the developing world. A controversy around which this study focuses is the nature of the relationships among population growth and change and these other factors.

This section will briefly examine governmental responses in the developing regions concerning the relationship between population and development. However, before beginning a discussion of governmental responses to population growth and change in developing societies, two key terms need to be defined. These terms are "population problem," and "population policy."
A "problem," as the term is employed in this study, is a discrepancy which exists between a perceived present state and a desired future state (or desired present state). With regard to policy decision-making, "problems" are thus defined as such deprivations as perceived by decisionmakers. The substantive nature of a problem, as defined by a decisionmaker, is determined by the decisionmaker's perception of the cause-effect relationships existing among the various elements of the condition with which s/he is confronted. Thus, a "population problem" is defined as a perceived deprivation in the decisionmaker's task environment, the cause of which the decisionmaker believes is related to demographic factors.

In a recent survey of governments in seventy developing societies Stamper (1973) identified eleven general types of "population problems," which were mentioned by twenty-seven of the governments surveyed. These problems are listed in Table 19 in order of frequency. Nineteen governments had development plans which mentioned the constraining effects of population growth on economic growth (most often defined as per capita income). The next two highest ranking "problems" were the "high rate of population growth (in and of itself)," and unemployment. As can be seen from the chart, most of the "population problems" identified relate to demographic pressures on different sectors of society or on governmental services.

4 These 27 were the only governments to recognize population problems in their development plans. The 27 countries combined contain nearly 71 percent of the total combined population of all 70 countries.
### TABLE 19

**TYPES OF POPULATION PROBLEMS CONTAINED IN DEVELOPMENT PLANS**

<table>
<thead>
<tr>
<th>Types of population problems</th>
<th>Total number of countries (of 70 studied)</th>
<th>Africa (36 countries studied)</th>
<th>Asia (31 countries studied)</th>
<th>Latin America (33 countries studied)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic growth reduced by population growth</td>
<td>19</td>
<td>4</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>High rate of population growth (in and of itself)</td>
<td>18</td>
<td>5</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Unemployment</td>
<td>18</td>
<td>5</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Increasing school-age population</td>
<td>18</td>
<td>5</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>High dependency ratio</td>
<td>15</td>
<td>5</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Population pressure on health services</td>
<td>12</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Population pressure on social services</td>
<td>12</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Population pressure on housing</td>
<td>12</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Population pressure on agricultural system</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Decrease in individual standard of living</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Population density</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

*Source: Stamper, 1973:5.*

Just as significant as the 27 governmental development plans which recognized population problems were the 43 plans which did not. Although these 43 governments represent countries which contained only 29 percent of the total combined population of the 70 countries surveyed, 17 of these countries had annual population growth rates of three percent or greater. In the development plans of these 43 governments little or no attention was paid to proposing policies to affect the causes of population growth. Similarly, little or no emphasis was placed on "planning that is concerned with the consequences of population dynamics" (Stamper, 1973: 5).

The term "population policies" as employed in this study is defined broadly and refers to both deliberate attempts by organizations and institutions (including governments) to affect population size,
structure or geographic distribution within a specified social setting and to efforts designed explicitly to reduce the consequences of such changes in populations.

Localized Responses to Population Growth and Change in Poor Societies

Prior to the second world war, there was little activity in poor societies concerning the phenomenon of rapid population growth. Such activity which did occur during that time manifested itself in the form of a few family planning clinics in India, Hong Kong and China. In India, following the end of World War I, a neo-Malthusian League was established in Madras. In 1930, the first government-sponsored birth control clinic in the world was opened in the state of Mysore (Symonds and Carder, 1973).

Following the close of World War II, renewed concern over the population growth developed in these societies. In 1949, family planning associations were established in India and Singapore. During the 1950's, similar nongovernmental associations formed in Hong Kong (1950) and Ceylon (1953), Pakistan (1953), Taiwan (1955), Malaysia (1958), and Thailand (1958) (Berelson et al., 1966). Thus, a concern over population growth began to become manifest in the form of action oriented organizations.

In a few developing societies outside of Asia concerned groups were also forming family planning associations. During the late 1950's such bodies were formed in Rhodesia (1955), Uganda (1956), Kenya (1957), Mauritius (1957), Nigeria (1958), and Sierra Leone.
Governmental support of family planning related services was authorized in Puerto Rico in 1937 and in Barbados (1954). However, in Latin America and most areas under French influence, little interest in such activities surfaced (Symonds and Carder 1973: 100-101),

It is often difficult to distinguish between governmental policies which deliberately influence fertility and those which influence fertility indirectly. A great range of measures are theoretically available to governments wishing to reduce fertility. Table 20 illustrates a number of such measures arranged in order of degree of compulsion. The most restrictive pronatalist measures appear at the top of the table. The most restrictive antinatalist measures appear at the bottom of the list. It is easy to imagine how some political and social systems make it next to impossible for governments operating therein to adopt certain measures. This is especially true of the impositions of involuntary fertility control.

According to a World Bank Staff Report (1974), over 70 percent of the world's population live in societies which offer government sponsored family planning services. This figure says nothing, however, regarding the distribution and/or outreach of such services within those societies. Thus, given the lack of communication and transportation infrastructures in many less economically advanced societies, it seems quite likely that this seventy percent figure could be very misleading.

Table 21 provides a distribution of the world's population by type of government policy on population and family planning activities.
### TABLE 20

**A Continuum of Population Policy Positions Directly Influencing Fertility**

<table>
<thead>
<tr>
<th>PRONATALIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of contraceptives prohibited</td>
</tr>
<tr>
<td>Contraceptive sales illegal</td>
</tr>
<tr>
<td>Contraceptive sales allowed, advertising illegal</td>
</tr>
<tr>
<td>Pronatalist incentives</td>
</tr>
<tr>
<td>Income tax deductions for children</td>
</tr>
<tr>
<td>Maternity benefits</td>
</tr>
<tr>
<td>Child allowances</td>
</tr>
<tr>
<td>Public housing preferences for large families</td>
</tr>
<tr>
<td>Scholarships</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LAISSEZ FAIRE</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ANTINATALIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Official support of voluntary family planning programs</td>
</tr>
<tr>
<td>Cash subsidies to private organizations</td>
</tr>
<tr>
<td>Facilities provided free or at subsidized rents</td>
</tr>
<tr>
<td>Official family planning program</td>
</tr>
<tr>
<td>Use of public health services to supply family planning services</td>
</tr>
<tr>
<td>Health advantages advertised</td>
</tr>
<tr>
<td>Official family planning program including motivation campaign</td>
</tr>
<tr>
<td>Demographic target</td>
</tr>
<tr>
<td>Use of mass communications, group meetings, home visits, postpartum program</td>
</tr>
<tr>
<td>Population education</td>
</tr>
<tr>
<td>Official family planning program with economic incentives</td>
</tr>
<tr>
<td>Payments for acceptance (immediate or deferred)</td>
</tr>
<tr>
<td>No-birth/no pregnancy bonus schemes</td>
</tr>
<tr>
<td>Dowry for late marriages</td>
</tr>
<tr>
<td>Scholarships for children of small families</td>
</tr>
<tr>
<td>Curtailment of rights and privileges with excess children</td>
</tr>
<tr>
<td>Social security benefits conditional on small families</td>
</tr>
<tr>
<td>Discrimination in favor of small families for public housing</td>
</tr>
<tr>
<td>Curtailment of maternity leave for higher parity pregnancies</td>
</tr>
<tr>
<td>Restraints on marriage</td>
</tr>
<tr>
<td>High minimum legal age</td>
</tr>
<tr>
<td>Social sanctions, e.g., housing restrictions, scholarships</td>
</tr>
<tr>
<td>Restrictions on number of children</td>
</tr>
<tr>
<td>Marketable licenses to have children</td>
</tr>
<tr>
<td>Social sanctions</td>
</tr>
<tr>
<td>Taxes on children</td>
</tr>
<tr>
<td>Involuntary fertility control</td>
</tr>
<tr>
<td>Temporary sterilizing agent</td>
</tr>
<tr>
<td>Compulsory sterilizing agent</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Government position</th>
<th>Total world</th>
<th>Developing countries</th>
<th>Developing countries</th>
<th>Developing countries</th>
<th>Developing countries</th>
<th>Developing countries</th>
<th>Developing countries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>All positions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of contraceptives prohibited</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales illegal</td>
<td>1.0</td>
<td>3.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales allowed, advertising illegal</td>
<td>0.7</td>
<td>2.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pronatalist incentives</td>
<td>2.6</td>
<td>8.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laissez faire</td>
<td>17.3</td>
<td>30.1</td>
<td>11.9</td>
<td>37.4</td>
<td>3.6</td>
<td>39.3</td>
<td>7.3</td>
</tr>
<tr>
<td>Pronatalist</td>
<td>(10.2)</td>
<td>(22.8)</td>
<td>(4.9)</td>
<td>(8.1)</td>
<td>—</td>
<td>(36.9)</td>
<td>—</td>
</tr>
<tr>
<td>Neutral</td>
<td>(6.6)</td>
<td>(7.3)</td>
<td>(6.3)</td>
<td>(27.1)</td>
<td>(3.0)</td>
<td>(2.4)</td>
<td>(7.3)</td>
</tr>
<tr>
<td>Antinatalist</td>
<td>(0.5)</td>
<td>—</td>
<td>(0.7)</td>
<td>(2.2)</td>
<td>(0.6)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Official support of voluntary programs</td>
<td>7.1</td>
<td>10.6</td>
<td>5.6</td>
<td>24.8</td>
<td>1.4</td>
<td>10.3</td>
<td>—</td>
</tr>
<tr>
<td>Official program</td>
<td>18.0</td>
<td>44.8</td>
<td>6.7</td>
<td>16.5</td>
<td>0.9</td>
<td>36.1</td>
<td>47.8</td>
</tr>
<tr>
<td>Official program including motivation campaign</td>
<td>16.8</td>
<td>—</td>
<td>23.9</td>
<td>21.3</td>
<td>25.6</td>
<td>14.3</td>
<td>44.9</td>
</tr>
<tr>
<td>Official program and economic incentives</td>
<td>14.9</td>
<td>—</td>
<td>21.2</td>
<td>—</td>
<td>28.0</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Curtailment of rights and privileges with excess children</td>
<td>0.1</td>
<td>—</td>
<td>0.1</td>
<td>—</td>
<td>0.1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Restrictions on marriage</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Restrictions on number of children</td>
<td>21.5</td>
<td>—</td>
<td>30.6</td>
<td>—</td>
<td>40.4</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Involuntary fertility control</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>


*Sources: Tables 19, 20 and Annex Table 16. World Bank, 1974: 73.*
Different policy orientations are apparent in different regions of the developing world. Latin American governments, in general, demonstrate the least emphasis on population policies. Thirty-nine percent of the population in this region live under governments which have adopted laissez faire attitudes toward population growth. Even in this region, however, half (50.4 percent) of the population live in countries offering family planning services in existing public health services.

In Africa nearly two-thirds (62.6 percent) of the population live under governments which either provide official support for voluntary family planning programs, or at least offer family planning in their public health services. As illustrated in the table, the remaining 37.4 percent of the population live under laissez faire policies.

In Asia a vast majority (94 percent) of the population live in countries where governments at least have established official family planning programs. Over 40 percent of the Asian population live in China, a society in which the government seeks to control the number and timing of births. An additional 28 percent of the total population of Asia live in India where the government provides economic incentives to reduce births.

Stamper (1973) has provided us with a much closer look at the roles that population policies play in development plans of poor countries. As was stated above, he examined such plans for 70 developing countries. Table 22 presents a summary of his findings and compares the number of population policies mentioned in development plans with corresponding national population policies.
**TABLE 22**

**POPULATION POLICY IN DEVELOPMENT PLANS COMPARED WITH THE NATIONAL POPULATION POLICY**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td></td>
<td>1960-1975</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia</td>
<td></td>
<td>1960-1975</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latin America</td>
<td></td>
<td>1960-1975</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Official population policies based on United Nations, Demographic Yearbook, 1960 (New York, 1961). These policies are compared to planned annual increases in population. The term 'planned' refers to the period up to 1975. The term 'official' refers to the period up to 1960.*

**Notes:**
- The policies refer to the planned annual increase in population.
- The official population policies are based on United Nations projections as of 1960.
- The planned annual increases are based on development plans as of 1975.
- The comparison is made to highlight the degree of alignment between planned and official policies.

Stamper has categorized development plans into four main areas:

1. Development plans in this category contained a policy to reduce rates of population growth and supported programs designed for a reduction. All the countries in this group with one exception supported family planning programs in their development plans. In a few instances, the programs went beyond family planning in an attempt to influence the age at marriage, create alternative roles for women, and so forth. Development plans needed only to recommend programs to reduce fertility to be included in the category. Thus, some countries in the group actually have such programs, whereas other countries merely recommended them.

2. Development plans in the second category stated a policy in favor of reduced population growth but did not discuss a program or governmental action to achieve it.

3. Development plans in the third category proposed family planning programs for such nondemographic reasons as maternal health or family welfare. Development plans in which family planning was supported, but for no stated reasons, also are included.

4. The fourth category is a residual one in which all other countries not within the other groupings are included. Most of the countries in this category did not discuss population matters, although a few did recognize population problems without proposing related policies or programs. None of the development plans expressed explicit pronatalist policies, with the exception of Ethiopia, which called its rapid rate of population growth "encouraging."

(Stamper, 1973: 9)

Although 27 of the 70 governments mentioned some type of population problem in their plans, only 18 of these mentioned policies and programs to reduce population growth rates. Out of this group two governments -- Panama and Uganda -- did not actually have official policies to reduce population growth rates. Rather, they merely recommended such policies in their development plans. In addition to the 16 governments whose development plans mentioned policies to reduce fertility and who also actually had official national population pol-
icicities, 11 other governments had official policies to reduce population growth rates.5

The 18 societies whose governments mentioned policies and programs to reduce population growth contained 64 percent of the combined population of the 70 societies studied. In Asia the proportion of the combined regional population whose governments' development plans contained mention of such population policies was 90 percent, whereas in Latin America the proportion was only nine percent (Stamper, 1973: 10).

Dorothy Nortman and the Population Council provide yearly updates of data on population and family planning programs. In the latest report (1975) it was reported that 34 governments have official policies to reduce population growth rates. Table 23 illustrates the number of countries and distribution of the population in the major regions of the developing world, by government position in population growth and family planning for 1975.

In 1975, 34 governments had official policies to reduce population growth. This category includes seven governments from Africa, nine from Latin America and 18 from Asia and Oceania. Together this group includes 77 percent of the combined population of the 127 developing societies included.

---

5 In addition to the 25 governments listed in Table 23 who have official population policies, the Dominican Republic and the Peoples' Republic of China also had official policies to reduce population growth.
**TABLE 23**

Number of countries and distribution of the population in the major regions of the developing world, by government position on population growth and family planning, 1975

<table>
<thead>
<tr>
<th>Government position*</th>
<th>All developing countries*</th>
<th>Africa</th>
<th>Latin America*</th>
<th>Asia and Oceania*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of countries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Official policy to reduce the population growth rate</td>
<td>127</td>
<td>48</td>
<td>22</td>
<td>47</td>
</tr>
<tr>
<td>Official support of family planning activities for other than demographic reasons</td>
<td>34</td>
<td>7</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Government position unknown</td>
<td>29</td>
<td>13</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Remainder: no policy to reduce the growth rate and no support of family planning activities</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>1974 population (in millions)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Official policy to reduce the population growth rate</td>
<td>2,771</td>
<td>391</td>
<td>237</td>
<td>2,093</td>
</tr>
<tr>
<td>Official support of family planning activities for other than demographic reasons</td>
<td>2,177</td>
<td>63</td>
<td>103</td>
<td>1,931</td>
</tr>
<tr>
<td>Government position unknown</td>
<td>423</td>
<td>185</td>
<td>104</td>
<td>73</td>
</tr>
<tr>
<td>Remainder: no policy to reduce the growth rate and no support of family planning activities</td>
<td>26</td>
<td>0</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td><strong>Percent distribution of population</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Official policy to reduce the population growth rate</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Official support of family planning activities for other than demographic reasons</td>
<td>77</td>
<td>21</td>
<td>38</td>
<td>33</td>
</tr>
<tr>
<td>Government position unknown</td>
<td>15</td>
<td>48</td>
<td>57</td>
<td>3</td>
</tr>
<tr>
<td>Remainder: no policy to reduce the growth rate and no support of family planning activities</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

* Government positions are based on the latest information available, and population data are estimates for 1974. For a full description of the criteria used to classify government positions and the problems encountered, see text and the individual country classifications given in Table 6. Positions specified correspond to codes "A," "B," "C," and "D," respectively, in Table 6.

- Development status is based primarily on stage of economic development.
- For more detail see footnote a, Table 1. Also note footnote b, below.
- Includes the Caribbean area plus Central and South America, but excludes Argentina (25 million) and Uruguay (13 million), both of which have low fertility.
- Excludes Japan (110 million) and Israel (3 million), which have low fertility. Includes Melanesia, Polynesia, and Micronesia in Oceania (4 million).
- The count of countries with neither a policy to reduce the growth rate nor support of family planning excludes sovereign states of high fertility with population under 100,000.
- Includes the Khmer Republic, North Korea, and Laos.

In the above discussion we have seen that a large proportion of the peoples living in developing societies are governed by official policies supporting reductions in population growth rates. This situation prevails in spite of the fact that only 27 percent of the governments in developing regions have such policies. Such population policies of differing governments were not formulated in total isolation of one another and the rest of the world. Indeed, quite the opposite is true. The following chapter examines the origins and nature of transnational activities in the area of rapid population growth and change.
CHAPTER IV

TRANSNATIONAL RESPONSES TO POPULATION GROWTH AND CHANGE

Introduction

In the preceding chapter, vast inequalities and differential growth rates existing between developed and developing societies were illustrated. In very recent years these inequalities have become even greater. Drastic increases in the prices of oil, food, and fertilizer in the world market have compounded the problems confronting governments in developing societies. Between 1972 and 1974 the price of wheat increased three-fold. The price of a barrel of oil rose from $3.40 in 1973 to $8.50 in 1974. Prices for nitrogenous and phosphate fertilizers also rose sharply. Such price increases place tremendous burdens on export receipts of developing countries, drastically decreasing the amount of financial resources available for development purposes.

The external debt owed by governments in developing societies is similarly increasing at an alarming rate. In 1971 the total external public debt outstanding of governments in 81 developing societies was over $79 billion. This figure was double the amount of debt owed just six years earlier (Howe, 1974: 17).

The yearly burden of paying the principal and interest on this debt in 1972 reached about $7.3 billion, which was equivalent to 11 percent of their exports that year. This means that these countries must borrow at an increasingly rapid rate just to keep the net transfer of finance (gross flow less debt service payment) from declining. And the more they borrow today, the higher will be the debt service due tomorrow. For example,
in 1973, nine bilateral aid programs plus the hard loan window of the World Bank collected more from India in debt service than they extended to it in new loans and grants (Howe, 1974: 17).

These desperate conditions, coupled with the unprecedented rapid growth of human populations, confront a vast majority of the world's peoples. As population increases, so does the demand for oil, food, and fertilizer. However, with the prices for these commodities drastically rising, it is increasingly difficult to balance the supply demand equation. Such difficulties have spurred calls for help both from within poor and relatively rich societies.

The discussion in this chapter begins with an examination of transnational responses to population growth and change in the context of these social and economic trends. The development of the international debate concerning the nature of the interrelationships among demographic, social and economic variables is then discussed. A synthesis of competing positions in the "debate" is the third main objective of the study.

**Historical Trends in Transnational Population Activities**

Although Thomas Malthus in his pessimistic *Essay on the Principle of Population* warned against the impending dangers of overpopulation in 1798, transnational activities aimed at limiting population growth are a relatively recent phenomena. In Europe and North America during the Nineteenth and early Twentieth Centuries growing populations were generally considered desirable. At the same time little was known of the demographic conditions existing in Asia, Africa and Latin America. Such a lack of concern was not universal, however. A relatively small group of birth control proponents grew up during this time.
In Paris at the turn of the century an international union -- La Federation Universelle de le Regeneration Humaine -- was formed by neo-Malthusians from several European societies (Symonds and Carder, 1973: 11). Between that time and 1925 five other neo-Malthusian conferences were held: Liege (1905); the Hague (1910); Dresden (1911); London (1922); and New York (1925).

The main topic of debate of these conferences was quite different from the contemporary population debates, however. The main theme most often was the relationship between population growth and international tension. At the 1925 International neo-Malthusian and Birth Control Conference held in New York a resolution was passed which urged the League of Nations to appoint a commission to study the relationships between population size and war and to make recommendations to the member governments (Symonds and Carder, 1973: 11; and Proceedings of the Sixth International neo-Malthusian and Birth Control Conference, New York, 1925, Resolutions).

The transnational activities of Margaret Sanger, the founder in 1921 of the Planned Parenthood Federation of America, are perhaps the most notable example of early nongovernmental efforts in population control. During the early decades of the Twentieth Century, she travelled widely, speaking to individuals and groups from various societies about birth control (Sanger, 1938). In 1925 she organized the sixth international neo-Malthusian Conference held in New York (Symonds and Carder, 1973: 11). At that conference a resolution was
adopted which urged that an international commission be appointed "to study this question of birth control with a view to making recommendations to the constituent nations" (Proceedings of the Sixth International neo-Malthusian and Birth Control Conference, New York, 1925, Resolutions). This resolution did not, however, motivate subsequent intergovernmental action. Sanger, refusing to give up, attempted to include officials from the League of Nations in a World Population Conference held in Geneva in 1927. The Secretary-General of the League, however, was extremely reluctant to allow official involvement of League personnel in such sensitive matters as population. Many European governments were concerned about declining populations. Numerous governments had established laws prohibiting the dissemination of information on contraception and birth control. Other governments had laws prohibiting the sale, distribution and advertising of contraceptives (Symonds and Carder, 1973: 11-19).

As was stated above, little consideration was given to demographic conditions in developing societies. The Birth Control International Information Centre did, however, organize a conference in 1933 to discuss the "population problems" of China, India and Japan. A year later the Centre sent Edith How Martyn to visit India and "to put the case for birth control" (Symonds and Carder, 1973: 9). Similarly, Margaret Sanger spoke at the annual All India Women's Conference in 1936. "When the work of the Centre was transferred to the newly formed Family Planning Association in 1939, the international subcommittee decided to concentrate on providing support for the expansion of birth control activities in India" (Symonds and Carder, 1973: 9).
However, little concrete action was taken on the transnational level during the inter-war period.

As in the League of Nations period, after the second world war, European governments were primarily concerned (with relation to population) with the problem of decreasing growth rates. To these governments "population policy" was translated as meaning measures designed to increase family size. These were the governments who urged the formation of the Population Commission within the newly formed United Nations Organization. When the Commission was established in 1946, however, the aims of the body were articulated in much broader terms. However, the work of the Commission was restricted primarily to an information function.

During the late 1940's and early 1950's various United Nations (U.N.) bodies and specialized agencies considered the question of the role that the United Nations should play in population matters. It was determined that U.N. bodies should play no role in population matters beyond the compilation of demographic information. This posture of non-involvement lasted until the early 1960's.

Despite the inaction going on at the intergovernmental level, non-governmental activity was taking place. A few early transnational non-governmental activities were discussed above. Some of the earliest attempts to focus on the interrelationships between population and development were sponsored by the Milbank Memorial Fund. Under the sponsorship of the Fund, a group of demographers, economists, and public health experts were brought together for a series of meetings.
The topics included: "International approaches to problems of under-developed areas" in 1947; "Modernization programmes in relation to human resources and population problems" in 1949; and "Interrelations of social, economic and demographic problems in selected underdeveloped areas" in 1953 (Symonds and Carder, 1973: 53).¹

Four nongovernmental organizations were founded in 1952, which for more than a decade were to serve as the primary funders of population-related assistance activities. These organizations are the Ford Foundation, the Rockefeller Foundation, the International Planned Parenthood Federation, and the Population Council. The funding provided by these organizations has grown tremendously since 1952; and today these four still function as major sources for programs and research in population.

In 1954 a World Population Conference, under the auspices of the U.N. in collaboration with the International Union for the Scientific Study of Population (IUSSP) and various specialized agencies, was held in Rome. This conference was strictly a scientific gathering and participants were invited to attend in their individual capacities. Nominations were made by (1) governments, (2) scientific nongovernmental organizations (NGOs), (3) interested specialized agencies, and (4) other interested experts (Resolution 435 (XIV), OR of ECOSOC, 14th Session, 1952, Supplement No. 1: 27-28).

¹For summaries of the discussions conducted at these meetings, see the Milbank Fund Quarterly and the Proceedings of the Round Tables held at the Fund's annual meetings for these years.
The substance of the debate at the Rome Conference did not focus to any great extent on the issue of rapid population growth in developing societies. However, one session was devoted to the interrelations of population, economic development and social change. At this session a conflict emerged between the demographers from the west and those from socialist states. The Marxist demographers argued that the real problem facing developing societies was their economic and social structures, not rapid population growth (Symonds and Carder, 1973: 85).

As was discussed above, little attention was given in United Nations bodies and specialized agencies between 1953 and 1961 to the question of rapid population growth. However, in the early 1960's this situation began to change. As a result of refined population projections, the results of censuses taken in 1960 and numerous other factors, concern mounted over rapid population growth.

In 1962 a memorandum resolution sponsored primarily by Denmark and Sweden entitled, "Population Growth and Economic Development" was sharply debated in the U.N. General Assembly second committee. As passed, Resolution 1838 (XVII), among other things, called on the Secretary-General to query member governments concerning the population issue. The Population Commission was asked to intensify its efforts in population-related research. Following the passage of this resolution, numerous other United Nations bodies and related agencies debated the roles that they should play in the population assistance field.

It was under the auspices of ECAFE, however, that the real headway was made concerning substantive UNO action in the population area. In
1963 ECAFE sponsored an Asian Population Conference in New Delhi. Growing out of this conference was a three-fold resolution concerning UNO activity with regard to rapid population growth. The three major points of this resolution were: (1) rapid population growth was considered a serious obstacle to development; (2) regional collaborative efforts in population area should be increased; and (3) U.N. bodies should become more action-oriented in this area. A few months later (March, 1964) the general conference of ECAFE and later of ECOSOC approved these basic principles articulated by ECAFE.

It was not until the 21st General Assembly in 1966 that the U.N. General Assembly adopted a resolution calling for action-oriented programs, such as technical assistance programs, in the population control area.\(^2\) This action orientation was a marked change over previous UNO commitments to the problem of rapid population growth. The 1965 second U.N. sponsored World Population Conference had been articulated solely as a meeting held to facilitate the exchange of demographic information. The official posture of U.N. related bodies began to change rapidly after the 1966 resolution was adopted.\(^3\) The formation and development of the UNFPA during this period is witness to such transition.

\(^2\) General Assembly Resolution 2211 (XXI) of 17 December, 1966.

In April, 1970, the U.N. Economic and Social Council adopted Resolution 1484 (XLVIII) which called for an intergovernmental World Population Conference to be held under United Nations auspices in 1974. Later that same year (11 December) the General Assembly passed Resolution 2683 (XXV) which designated 1974 as World Population Year (WPY). The resolution further requested that the Secretary-General prepare a program of activities to be undertaken by the United Nations system during that year. Also in 1970, the General Assembly adopted an International Development Strategy for the Second United Nations Development Decade which stated:

Those developing countries which consider that their rate of population growth hampers their development will adopt measures which they deem necessary in accordance with their concept of development. Developed countries, consistent with their national policies, will upon request provide support through the supply of means for family planning and further research. International organizations concerned will continue to provide, when appropriate, the assistance that may be requested by interested Governments. Such support or assistance will not be a substitute for other forms of development assistance (General Assembly Resolution 2626 (XXV); para. 65).

During 1973 numerous population related activities were carried out by governments, international agencies, private organizations and individuals throughout the world. More than 65 governments participated in WPY activities. National conferences were held on population and development. Similarly, seminars and research studies were held. Other activities sponsored by national governmental bodies include: preparation and distribution of special news articles; preparation and distribution of films and radio tapes; educational activities in schools; and the issuing of commemorative stamps and coins. In July the UNFPA
sponsored a Conference of Representatives of National Population Commissions or Similar Governmental Authorities in Brussels. "Representatives to the Conference agreed that the continuing work of the population commissions and similar governmental authorities was essential to the promotion of long-term objectives in the population field (UNFPA, 1974: 2).

During 1974, more than 50 major nongovernmental organizations (NGOs) undertook activities related to WPY. In addition, an estimated 1,000 private groups informed UNFPA of their intentions to organize related information and communication programs. Major NGO conferences and seminars held during 1974 include (among others): an International Planned Parenthood Federation (IPPF) Workshop for NGOs (Teheran in April); World Assembly of Youth (WAX) seminars for young women, young teachers and rural youth in Latin America, the Caribbean, and Africa; and International Education Development (IED) seminars for church-related groups (in Nairobi, Accra, and Bucharest).^4

The World Population Conference held in Bucharest in August, 1974, represented the culmination of much planning and coordination, and was the focal point of the World Population Year. The Conference was the first global intergovernmental conference to consider population issues. This intergovernmental conference, however, was not the only population related activity going on in Bucharest. In fact, Bucharest was the

focal point for numerous other conferences, symposia, and exhibitions. Independent from the Conference, private individuals and representatives of nongovernmental associations held a concurrent conference, the Population Tribune. These participants came from 92 nationalities in all parts of the world. The Tribune served as both a forum for the international exchange of views on population and as a platform from which to project nongovernmental inputs into the World Population Conference. In addition, at least eight other associated activities, including an International Youth Population Conference and an Encounter for Journalists were held in Bucharest around the time of the Conference.

Delegates at the World Population Conference adopted by consensus a World Population Plan of Action and a series of resolutions (I-XXI) and Recommendations (I-IV). The substance of these items, as well as

5 The organizing committee for the International Youth Population Conference consisted of: World University Service (Convenor), World Alliance of Young Men's Christian Associations (Treasurer), International Union of Students, International Youth and Student Movement for the United Nations, Union of Communist Youth of Romania, World Assembly of Youth, World Federation of Democratic Youth, World Young Women's Christian Association, International Planned Parenthood Federation (Consultant member), and World Association of Girl Guides and Girl Scouts (consultant member).

6 For texts of the Plan, Resolutions and Recommendations, see the report of the conference (E/5585 and Corr. 1-E/CONF.60/19).
the nature of the debate surrounding their adoption, will be discussed in detail later. For the time being, it is sufficient to note that:

The Conference decided on the World Population Plan of Action as a policy instrument within the broader context of the internationally adopted strategies for national and international progress, 'having due regard for human aspirations for a better quality of life and for rapid socio-economic development, and taking into consideration the interrelationship between population and situations and socio-economic development.' It considered the Plan of Action as an important component of the system of strategies -- including particularly the International Development Strategy for the Second United Nations Development Decade and the Declaration and Programme of action on the Establishment of a New International Economic Order -- and as an instrument of the international community for the promotion of economic development, quality of life, human rights and fundamental freedoms (World Population Plan of Action, preamble and paragraph 1; Population Newsletter, No. 20: 5).

On 17 December 1974 the General Assembly of the United Nations passed a resolution (3344 (XXIX)) noting with satisfaction the report of the World Population Conference. The resolution called for the implementation of the World Population Plan of Action and requested that the Population Commission report to the Economic and Social Council at its 58th session, concerning implications of the conference. Furthermore, the Resolution requested that ECOSOC forward its recommendations to the General Assembly at the Assembly's seventh special session (September, 1975) and the 30th regular session (Fall, 1975). Replying to the Assembly's requests, the Economic and Social Council adopted four resolutions (1942 (LVIII); 1943 (LVIII); 1946 (LVIII); and 1926B (LVIII)) and seven decisions (87 (LVIII) to 93 (LVIII)) in May, 1975, based on recommendations and draft resolutions by the Population Commission.7

7For summaries of the contents of these resolutions and decisions see Population Newsletter, No. 20: 36-41.
Since January, 1975, a series of regional intergovernmental meetings have been held to discuss regional operationalization of the Plan's recommendations. Meetings were held in Bangkok (14-20 January); Mexico City (3-7 March); Doha, Qatar (24-25 March); Beirut (1-2 May); Lusaka, Zambia (16-22 April); and Geneva (7-11 July). These regional consultations represent only a small portion of the post-Bucharest follow-up activities. In September, 1975, an International Meeting on Demographic Information Storage and Retrieval was held in Mexico City. This meeting, which was organized by the Committee for International Coordination of National Research in Demography (CICRED), was sponsored by the International Labor Organization and the International Committee for Social Science Information and Documentation, with financial support coming from UNFPA. The main focus of this meeting was the development of a cooperative international population information network. In December other U.N. related meetings were held to review the progress made in monitoring population trends and implementing policies recommended by the World Population Plan of Action and to discuss the development of demographic models.


These meetings represent only a small portion of the post-Bucharest follow-up activities. However, a further inventory of such
activities is beyond the scope of this study. More central to the present concern is the politicization of the population issue as it emerged at the Bucharest conference.

Bucharest: A Confrontation of Images

As was mentioned above, the World Population Conference held in Bucharest was the first international governmental conference focusing on population issues. Present at the conference were representatives of 136 national governments, which had been invited under direction of Economic and Social Council Resolution 1672B (LII). However, the Conference was not the exclusive domain of governmental delegations. In accordance with ECOSOC Resolution 1835 (LVI) observers from the government of Papua New Guinea and four liberation movements were also invited. Representatives from 14 United Nations Organization bodies and five specialized agencies were in attendance. Eleven other international governmental organizations (IGOs) sent representatives to Bucharest, as did 109 non-governmental organizations. Before the Plenary sessions of the conference formal statements were heard from representatives from 105 governments, two liberation movements,


The 14 UNO bodies include: Department of Economic and Social Affairs, ECA, ECLA, ECAFE, ECE, ECWA, UNICEF, UNCTAD, UNEP, UNFPA, UNDP, UNIDO, World Food Conference, and World Food Program. The five specialized agencies include: ILO, FAO, UNESCO, WHO, and World Bank.

seven IGOs, seven NGOs, 16 United Nations related bodies, and a representative of the International Youth Population Conference.

The World Population Conference was organized into a Plenary body and three committees. The first Committee focused on population change and social and economic development, the Second Committee on population, resources and the environment, and the Third Committee on population and the family. Similar to the organizational structure of the General Assembly and its associated committees, each of the three conference committees were comprised of delegates from all 136 participating governments.

What is important for the present study is not the composition and structure of the conference, but instead, the nature of the debate carried on at Bucharest. Although the main focus of the conference was population, this issue became subsumed in a much larger debate concerning the relationship between population growth and social and economic development. However, much of the debate did not follow the laws of the classical debate between Marxists and neo-Malthusians. Instead, the deliberations were framed in the context of contemporary international relations, especially the present distribution of resources and economic wealth in the international system.

In the plenary sessions and in the meetings of the various committees competing positions soon emerged concerning the population/development issues. Underlying these positions were two basic conflicting viewpoints (images). These images, the positions connected with each image, and the country of origin of the delegates expressing each position are presented in Table 24.
IMAGES AND POSITIONS REPRESENTED AT THE WORLD POPULATION CONFERENCE

TABLE 24

IMAGES AND POSITIONS REPRESENTED AT THE WORLD POPULATION CONFERENCE

IMAG I E I . Demographic variables are integral parts of economic development, both affecting it and affected by it.

Positions Taken in Context of Image:
- There are very serious social and economic problems in many countries that continue despite strenuous efforts at social and economic development.
- Overly rapid population growth is not the cause of these continuing problems, but it does intensify their effects.
- Economic and social development of the Third World is desirable in its own right and ought to be pursued actively with full international assistance as required. Reductions in overly rapid population growth can make a notable contribution to the ultimate success of these efforts.
- Both rapid social and economic development and strenuous population policies and programs are required to bring population growth rates into balance with rates of economic and resource development. Hence, both approaches are complementary to the furtherance of human welfare, but neither is sufficient on its own.

IMAG E II . Demographic variables are wholly derivative effects of general social and economic development.

Positions Taken in Context of Image:
- Socio-called population problems are actually problems of inequality of wealth and resources resulting from the present world economic order and "super-consumption" in the developed countries.
- As in the past, growing numbers can readily be accommodated; what is needed is agricultural and industrial development under a proper social structure, and a redistribution of world wealth from the rich to the poor.
- Therefore the fundamental requirement of population policy is the establishment of a new international economic order that will eliminate the inequality of wealth and resources afflicting the world.
- Overly rapid population growth is currently a positive force for economic and social development, particularly because it provides sufficient labor for development and a youthful age structure for progressiveness. The People's Republic of China maintains that rapid population growth allows Third World countries to defend themselves against the attempted domination of the Super Powers.
- Fertility will eventually decline, but as a "natural" process resulting from true social and economic development rather than through "artificial" interventions such as population policies and programs. Key elements of the development process are the improved economic well-being of the population, reduced mortality, improved social security, and better education.
- Those "populationists" who are urging "artificial" population policies such as family planning upon poor countries do so out of a desire to direct attention from the true issues of development and to thereby maintain the status quo of inequality in the world.
- There is no "population problem" in the abstract; each mode of production (feudalism, capitalism, socialism) has its own laws of population. The so-called population problems of the Third World are a characteristic of the capitalist mode of production caused by international colonialism, neo-colonialism and imperialism.
- There is an need for population policies per se; in a properly organized society the demographic trends are adjusted automatically by social and economic forces.
- The Third World is being exploited, but by the capitalist developed countries rather than by developed countries as a whole.
- Some countries do have population problems that hinder their social and economic development.
- The major source of these problems is poverty, poor health, high mortality and lack of education.
- The primary solution to rapid rates of population growth is therefore rapid social and economic development. This can be achieved through the establishment of a new international economic order, leading to (1) reductions in both the inequality of wealth and resources in the world; (2) reductions in the "over-consumption" of the rich countries; (3) a more equitable distribution of the world's resources, both through transfers via development assistance and through changes in terms of trade.

Sources: Mauldin et al., 1974

Articulated by:
most of Asia (excluding China and India), most of Eastern Europe (excluding France and Italy), Iran, United States, Canada, Australia, New Zealand, Japan, and some Latin American states.

Franoplasto Sub-Saharan Africa, Algeria, Argentina, China, Albania, Romania, Cuba, Peru

Eastern Europe (excluding Romania and Yugoslavia)

India, Egypt, Mexico, Yugoslavia, Italy, and some Latin American and African states (Countries in this group placed varied emphasis upon the relative importance of socioeconomic development and population policies.)
Underlying the positions expressed by a majority of the delegations, primarily from the developing countries, was "the belief that demographic factors are wholly derivative effects of general social and economic development" (Mauldin et al., 1974: 362). The effects of demographic variables upon social and economic development were perceived to be inconsequential. Advocates of this image called for the creation of a new international economic order as the answer to any deprivation that might result from rapid population growth. Frequently referring to the "Declaration on the Establishment of a New International Economic Order" and the associated "Programme of Action" passed at the Sixth Special Session of the United Nations General Assembly in May, 1974, these delegates emphasized the need for a variety of measures, including:

1) a just and equitable relationship between prices of exports and imports that developing countries receive for their raw products and the prices they must pay for imported goods;

2) improved access to markets in developed countries through trade preferences and the elimination of trade barriers;

3) arrangements to mitigate the effects of inflation on developing countries;

4) export trade promotion; and

5) an international code of conduct regulating transnational corporations.\(^{11}\)

The positions outlined under Image II in Table 24 represent this viewpoint.

\(^{11}\)The U.N. Monthly Chronicle 11, No. 5 (May, 1974) presents a summary of the proceedings of the Sixth Special Session. These proposals are provided solely as background elements. Although it would be interesting to examine these positions in more detail, such an endeavor is beyond the scope of the present study.
Press releases issued by the United Nations Press Section provide summaries of delegates' speeches as reported by U.N. Information Officers in attendance at the Conference. Portions of several such summaries are reported below.

Kemal Abdullah-Khodja, Secretary of Planning of the government of Algeria, claimed:

The population explosion was the result, not the cause of under-development. Population problems resulted from inequality and exploitation in the world. Because minimal conditions of development were often not present, the rapid increase in population might seem dangerous. It was necessary to transform the way of life and behavior of industrial countries. That task was just as important as the effects expected from the 'third world.' It was no longer just a question of the 'third world' stabilizing its population but also of the developed world putting the brake on its over-consumption (U.N. Press Section, Press Release, POP/107, 20 August 1974).

Juan Carlos Beltramino of Argentina stated:

Instead of carrying out indiscriminate birth control programs, the world should increase its food-producing capacity. Argentina wanted to increase its own population for its development and progress. The poorer countries could not be expected to reduce their population growth so that the rich ones could maintain a higher living standard (U.N. Press Section, Press Release, POP/107, 20 August 1974).

The Vice-Minister of Health of China, Huang Shu-tze, followed a similar, but more ideologically oriented line of argument.

The population growth in the third world was 'not a bad thing, but a very good thing.' This large population was important for the struggle against imperialism and hegemony and for development. Unemployment and poverty existed not because of over-population, but because of imperialist aggression and exploitation, particularly by the super-powers, which were 'the chief culprits responsible for unemployment and poverty in the world!' (U.N. Press Section, Press Release, POP/113, 22 August 1974).

The other basic viewpoint which was expressed at the conference was that demographic factors are integral parts of economic development,
both affecting it and affected by it. This perspective is represented by Image I in Table 24. Although this view was held by a minority of the delegates at Bucharest, the Planners of the Conference, as well as the major contributors to population and development assistance efforts, shared this perspective.

Under this construction even strenuous efforts at social and economic development may fail unless attention is paid simultaneously to demographic factors. This group's views were reflected in the Draft (though not in the final) Plan of Action, which argued that 'where trends of population growth, distribution and structure are out of balance with social, economic, and environmental factors, they can constitute serious barriers to the achievement of sustained development.' Hence, efforts directed to population factors are an integral part of any effective development strategy (Mauldin et al., 1974: 362).

In actual practice, this perspective is even more narrowly articulated. This mental model has led numerous individuals to argue for fertility control measures, such as family planning programs, as being cure-alls for numerous development problems experienced by many Third World societies.

Although strong support for this image came from the developed market economies, numerous developing societies (including most of Asia) also articulated this perspective. It is informative to review the statements that several representatives from developing countries made at the conference. The following statement is a summary of a speech by Raja Aznam Bin Maja Haji Ahmad of Malaysia.

His country shared the conviction that there was urgent need to alleviate if not solve problems posed by population growth as well as the population growth itself. Population variables influence development variables and visa versa; the great potential for a more meaningful relationship between the two must be explored and developed if the quality of life of the mass of people was to be enhanced (U.N. Press Section, Press Release, POP/119, 27 August 1974).
U Htain Lin of Burma stated that

Curbing population growth alone would not solve the problem of the developing countries. Steps had to be taken simultaneously for economic and social development (U.N. Press Section, Press Release, POP/117, 26 August 1974).

In spite of substantial differences separating the proponents of these two basic viewpoints (images) a World Population Plan of Action was produced by the end of the Bucharest Conference. However, the final plan was quite different from that proposed by the United Nations Secretariat. To the original Draft Plan of Action, which contained only four chapters and 93 paragraphs, no less than 300 amendments were introduced. Such conflict over the Draft Plan came as somewhat of a surprise to the conference planners. Finkle and Crane (1975: 93-97) provide an interesting commentary regarding the lack of foresightedness of these planners.

Most of the planners' hopes for the Conference were embodied in a Draft World Population Plan of Action, prepared by the Secretariat in consultation with outside sources. The planners gave little consideration to the results of the Sixth Special Session of the General Assembly and the resulting call for a new international economic order. This oversight is in large part a function of the high degree of specialization of population functions within the United Nations system and in many member governments.

The international population network is highly developed. The main participants in the network are population experts and individuals in population divisions of governments and United Nations bodies.
It was this network which was responsible for most of the inputs into the Draft Plan of Action. For the most part the individuals comprising the network operate with a common frame of reference and with a fairly common image of the "problem," Image I above. The preparation was left in the hands of population units, with little involvement from political levels. Thus, a false sense of unanimity had developed prior to the conference. The type of representation at Bucharest was considerably different, however. Many delegations included more politicians and diplomats than family planners and demographers.

The initiative for holding an international governmental conference on population was undertaken by individuals who believed rapid population growth to be a hindrance to development. The planning process for the conference systematically excluded input from individuals holding contrary positions (see Finkle and Crane, 1975: 93-97). Furthermore, Finkle and Crane (1974: 104) argue that the degree of functional specialization found in most large bureaucracies (especially the United States government) tends to isolate issues. Thus, special international forums are perceived as being necessary to discuss individual issues. From this perspective Bucharest was to be a conference focusing predominantly (if not exclusively) on population growth and change. While not denying the interrelatedness of other issues, there were other times and other forums to discuss those matters. As illustrated above, the debate at Bucharest ran counter to this philosophy.

To a large degree international politics played a major role in defining the positions put forth at Bucharest. Thus, the delegate from
India, whose government has a long established family planning program, was found arguing in favor of Image II. As Mauldin et al. (1974: 372) speculate, perhaps the government of India was attempting to play a "bridging" function between proponents of both images.

Even if international politics did play a large role in determining the positions taken at the conference, however, a basic conflict does exist concerning the role of demographic factors in social and economic development. The final text of the World Population Plan of Action, which was acceptable to a vast majority of adherents of both viewpoints, repeatedly underscores the importance, yet uncertainty, of knowledge of the interrelationships among demographic and social and economic factors for the formulation of development policies.

In paragraph 14, sub-paragraphs c and d, the importance of such interrelationships is stressed.

(c) Population and development are interrelated; population variables influence development variables and are also influenced by them; thus the formulation of a World Population Plan of Action reflects the international community's awareness of the importance of population trends for socio-economic development, and the socio-economic nature of the recommendations contained in this Plan of Action reflects its awareness of the crucial role that development plays in affecting population trends;

(d) Population policies are constituent elements of socio-economic development policies, never substitutes for them: while serving socio-economic objectives, they should be consistent with internationally and nationally recognized human rights of individual freedom, justice and the survival of national, regional and minority groups; (Mauldin, et al., 1974: 383).

These somewhat abstract statements only hint at the relative uncertainty regarding these interrelationships. A more direct statement is found in the call for further research found in paragraph 78, subparagraph n.
The following areas are considered to require research in order to fill existing gaps in knowledge:

...(n) The interrelations of population trends and conditions and other social and economic variables, in particular the availability of human resources, food and natural resources, the quality of the environment, the need for health, education, employment, welfare, housing, and other social services and amenities, promotion of human rights, the enhancement of the status of women, the need for social security, political stability, discrimination and political freedom... (Mauldin et al., 1974: 390).

Until and perhaps even after the results of further research in these areas prove convincingly that one or the other viewpoint is more or less accurate, the population/development policies (including assistance activities) of different individuals and organizations will most likely be based on conflicting mental models similar to those expressed at Bucharest.

The above discussion of historical transnational responses to population growth and change has been provided to complete the setting of the contextual environment in which transnational population assistance activities are carried out. In Chapter III, which focused mainly on geophysical aspects of the environment, localized governmental responses to changes in the geophysical environment were discussed. In this chapter it was demonstrated that such localized responses have not been undertaken in total isolation of one another and the global community at large. The "debate" concerning the nature of the interrelationships among demographic, social, and economic variables and the subsequent implications of such interrelationships for policy actions is not confined to international arenas. Quite to the contrary, studies concerning such interrelationships abound in scholarly literature. Such intellectual efforts are closely examined in the next two chapters.
CHAPTER V
RESEARCH ON THE DETERMINANTS OF FERTILITY

Introduction

In this and the following two chapters the fourth main objective of the research strategy will be confronted. That objective is to critically examine and synthesize the findings of scholarly research into the interrelationships among demographic, social and economic variables. This chapter focuses on research into the social and economic determinants of demographic change. In Chapter VI the literature concerning the impacts of demographic changes on social and economic factors is explored. Then, in Chapter VII the findings of both these bodies of literature are more critically examined and synthesized.

Scholarly concern over population growth and change can be traced back at least 2400 years to Plato's time, and quite possibly even earlier. Hutchinson (1967) and Overbeek (1974) review the development of "theories" concerning the relationships between population growth and change and socio-economic changes. There is little need to reiterate that development in detail here.

Of the early pessimistic writers on the subject, Malthus has by far received the most acclaim and criticism. Proceeding on the general premise that population tends to increase geometrically while
means of subsistence (food production) tends to increase only arithmetically, he argued that population would inevitably approach the limits of subsistence. In his thesis Malthus argued:

That the increase of population is necessarily limited by the means of subsistence.

That population does invariably increase when means of subsistence increases.

That the superior power of population is repressed, and the actual population kept equal to the means of subsistence by misery and vice (Malthus, 1926: 140-141; quoted in Hutchinson, 1967: 155).

Human misery, according to Malthus, was thus to a considerable extent the result of the social process whereby population grows at a too rapid rate relative to growth in the means of subsistence. Examined from another perspective, increases in population lead to reduction in per capita production (for a more detailed treatment of this point, see Hutchinson, 1967: 155).

One of Malthus' sharpest critics was Karl Marx (1906). Marx argued that there was no "universal law of population," such as the thesis of Malthus suggested. Poverty results from the mode of production associated with capitalism. In support of this position, he pointed to the exploitative nature of the class system and the surplus of labor created by the replacement of workers through automation.

Marx suggested that there existed a "law of relative surplus population" which was particular to capitalism (Marx, 1906: 675-676). Assuming that labor was the only source of value, he attempted to demonstrate the process by which laborers were systematically exploited and then replaced. According to Marx, wages (paid to workers for the production of value) are tied to the subsistence levels of workers
and their families. Only a portion of the work day is devoted to the production of value equal to the workers' subsistence and thus paid out to the worker in wages. This portion of the value Marx called "variable capital." Work over the time needed to cover wages creates "surplus value." This additional value is the employer's gain. From the workers' perspective, surplus value represents unpaid labor.

A large portion of the surplus value goes to capital accumulation ("constant capital"). This capital is reinvested in labor-saving equipment, which thus forces laborers out of work. In addition, such equipment helps to force competitors employing labor intensive methods of production out of business. Thus, the demand for labor further decreases and surplus of labor (unemployment) increases. It is social organization, argued Marx, not population pressure, which is responsible for the dilemma identified by Malthus. (For a more detailed discussion of Marx's critique of Malthus and his "law of relative surplus population," see Overbeek, 1974: 73-76.)

Aspects of the debate between Malthus and Marx can still be found in much of the contemporary population literature, as well as debates on this topic in international forums. The impact of this debate on the development of other, more recent frames of reference for examining the interrelationships among population growth and social and economic conditions is immeasurable. Two distinctive frames of reference appear to dominate the population development literature. One main thrust, which has tended to center around the idea of demographic transition, examines the impact social and economic conditions in population growth
rates. A second approach has tended to focus on the inverse relationship: the impact of population growth and change on social and economic conditions. This approach has been dominated by the construction of demographic-economic models.

This chapter focuses on empirical findings regarding the social and economic determinants of population growth and change. The ensuing discussion begins with an examination of the controversy surrounding the notion of demographic transition. Then, the scope of the discussion is broadened to consider the findings of other related research efforts.

"Theories" of Demographic Transition

At a very general level the term "demographic transition" is employed to describe a process of mortality and fertility changes brought about by various changes in social and economic institutions and processes. "Theories" of demographic transition are generally posited to be founded in actual historical experiences. Pointing to the experience of European societies, many advocates of the demographic transition thesis argue that societies pass through more or less well defined demographic stages as they become socially and economically (relatively) more advanced.

A recent report by the United Nations (1973: 58) identifies Landry (1909) as the individual who first attempted to identify various demographic stages. Other early efforts were also undertaken by Thompson (1929, 1946). However, the main thrust of what is identified today as the "Theory of Demographic Transition" is usually credited to researchers from the Princeton Office of Population Research.
It is not important here to debate the origins of the term "demographic transition" or even to discuss the nature of the differences of these early works. What is important, though, is that most of these early writings had two important characteristics in common. First, these authors treat population growth and change as a response to changes in social and economic institutions as a society develops from a predominantly agrarian to a predominantly industrial state. Such changes in population are caused by the subsequent interaction among the demographic variables affected. Second, the authors hypothesize a definite succession of stages through which societies move. Each stage is characterized by specific fertility, mortality and population growth trends (van de Walle and Knodel, 1967: 47).

Generally, three separate stages are identified. The first stage is characterized by both high fertility and high mortality rates. Thus, the resulting population growth rates are fairly modest. In the second stage fertility remains high. However, in response to social and economic developments mortality rates begin to decline. The interactions among the demographic variables during this stage (II) result in rapid population growth. The third and final stage is characterized by a similar decline in fertility rates, thus slowing down population growth rates. Coale and Hoover (1958: 10-13) illustrate such a three-stage process based on historical experience of present day "more developed" societies.

In a recent attempt at further developing the notion of demographic transition as an empirically testable theory, Beaver (1975: 8-11) has provided a fairly clear synthesis of the general causal
structure implied by previous proponents of demographic transition "theory." Figure 7 illustrates these causal linkages, as identified by Beaver (1975: 10). Socio-economic development, represented in the model as including "urbanization," "education," nonkinship institutions," and "consumption levels" (living standards), is assumed to be the basic cause of birth rate declines. However, this relationship is not posited to be a direct one; social, economic and/or psychological factors intervene between "socioeconomic development" and "desired-ideal family size." In addition, mortality is assumed to influence birth rate by mediating between desired-idea family size and the practice of birth control. The practice of some form of birth control then provides a direct impact upon birth rate. Beaver acknowledges that the "causal model" presented in Figure 7 is greatly simplified, omitting various variables and relationships of lesser importance. "This model does not pretend to be complete, but only a summary of some of the major relationships suggested by transition theory" (Beaver, 1975: 9).

Numerous writers have criticized various aspects of the demographic transition approach (see the discussion in United Nations, 1973: 58-63, for a more detailed treatment). Such criticisms include:

(1) The process of population growth and change in the various European societies from which the "theory" is drawn is far from being uniform;

(2) A "Theory" based on the historical experience of presently more developed Western societies is most likely not to accurately capture important factors determining population growth in other societies in other time periods;
FIGURE 7

CAUSAL MODEL OF DEMOGRAPHIC TRANSITION THEORY

Source: Beaver, 1975: 10.
(3) The "theory" of demographic transition is not a theory at all, but only a description of historical experience of certain societies.

Can the experience of modern Western economically developed market economies provide insight into the demographic processes presently occurring in developing societies? It is generally conceded that the experience of developed market economies cannot. The rapid decline in mortality which has been experienced in most developing societies since 1945 stands in marked contrast to the relatively slow declines in mortality which were experienced in Europe.

The recent steep mortality decline in the less developed countries has occurred, unlike in the past, in the absence of significant economic progress, and is considered to have been mainly the result of the spread of new techniques or techniques adapted from the more advanced countries in the fields of public health, sanitation and medicine (United Nations, 1973: 519).

Other major differences exist between today's developing societies and those societies which underwent development in the past. Developing countries today have substantially larger initial populations than did the developed market economies during their pre-industrial times. Also, today's developing societies are much more densely populated, thus resulting in more unfavorable population-resources ratios.

The United Nations report (1973: 553) cited above identifies the fundamental distinguishing factor between today's developing societies and the pre-industrial states of developed societies as
being population growth rates. Rates of population growth presently being experienced by developing societies are unprecedented in history.

The third criticism — that demographic transition theory is not a satisfactory theory — is also quite crucial to a formal modelling effort like the one with which we are concerned.

Transition theory, it is argued, is not a theory, but a description of historical events that have occurred in the developing countries with some regularity. It has only suggested certain major complexes of factors which presumably influence the components of population growth, and thus raises serious questions as to its explanatory and predictive value. As it is, the theory is an interpretation of turning points in demographic evolution rather than a system of logically consistent and explicit relationships that provide a basis for pertinent deductions and predictions of future developments (United Nations, 1973: 60).

Concepcion and Murphy (1967: 6) argue that, although the lack of specificity of fundamental processes and specific variables is regrettable, the present state of the demographic transition thesis should not inhibit the development of such a theory in the future.

What is required is not a re-examination of the theory of demographic transition. What is needed is the creation of a theory of the demographic transition. What is wanted is a theory that will tell us what fundamental relationships were involved in the historical transitions, what the key variables were, how the transition came about in the past, and how it might be repeated in the future (Concepcion and Murphy, 1967: 6).

A similar tactic is argued here. What does empirical evidence tell us about determinants of population growth and change in developing societies? Although empirical investigations into this matter are not numerous, some path-breaking work has been undertaken.

In an article appearing in Science (1969: 837-847) Frederiksen examined alternative models of "feedbacks in economic and demographic transition" in light of empirical evidence. Drawing heavily on
quotations from demographic/development literature, he constructed three alternative models of economic and demographic transition. Flow diagrams of these models appear in Figures 8-10. Frederikson argues that a neo-Malthusian model (Figure 8) appears to be quite plausible when attempting to explain failure of economic and demographic transition. However, in order to explain successful development, "we have to explain how countries proceed from low to high levels of production and consumption, and from high to low levels of mortality and fertility" (Frederiksen, 1969: 838). Thus, he has constructed the flow diagrams represented in Figures 9 and 10.

The revised neo-Malthusian model (Figure 9) allows for some reduction in fertility, so as to partially offset slowly decreasing mortality, thus minimizing population growth rates. Constant low population growth, coupled with slowly rising levels of living yield high levels of capital formation. The final results of such a revised neo-Malthusian process are high levels of production and intermediate levels of consumption, mortality and fertility.

The alternative model (Figure 10) constructed by Frederiksen (1969: 839) assumes that "improvements in the standard of living and decreases in the mortality and fertility rates are linked in a process of 'concurrent, circular, and cumulative causation' (to use the language of Gunnar Myrdal)."

Declines in mortality are assumed to be a necessary, but not a sufficient, condition for fertility reduction. Mortality declines affect fertility in two ways. First, fertility will decline in response to mortality declines in order to maintain desired family size. Second,
Low levels of production and consumption, and high levels of mortality and fertility.

- Increasing production per capita
  - Increasing levels of living

- Increasing application of alien technology
  - Increasing quantity of health services per capita
  - Increasing effectiveness and efficiency of health services

- Rapidly decreasing mortality
  - Rapidly increasing population growth
    - Decreasing production per capita
      - Decreasing levels of living
        - Constant high fertility
          - Slowly decreasing mortality
            - Slowly increasing population growth
              - Further decreasing production per capita
                - Further decreasing levels of living
                  - Constant high fertility
                    - Decreasing quantity of health services per capita
                      - Increasing mortality
                        - Decreasing population growth

Low levels of production and consumption, and high levels of mortality and fertility.

FIGURE 8

NEO-MALTHUSIAN MODEL OF FAILURE OF ECONOMIC AND DEMOGRAPHIC TRANSITION

Low levels of production and consumption, and high levels of mortality and fertility.

Increasing application of alien technology

Increasing effectiveness and efficiency of family planning as well as health services

Concurrently and commensurately decreasing fertility

Constant low population growth through slow and balanced declines in mortality and fertility with a slow rise in levels of living

Rapidly increasing capital formation

High levels of production, and intermediate levels of consumption, mortality and fertility.

FIGURE 9

NEO-MALTHUSIAN MODEL OF SUCCESSFUL TAKEOFF IN ECONOMIC AND DEMOGRAPHIC TRANSITION

increasing technological development
increasing socio-economic development

increasing production (per capta)
increasing consumption (per capta)

increasing levels of nutrition, sanitation, health services, etc.

decreasing mortality and morbidity

increasing fitness for work
increasing health
increasing length of productive life

increasing survival of children
increasing family planning

increasing investment in physical capital
increasing investment in human capital

decreasing dependency

decreasing fertility

high levels of production and consumption, and low levels of mortality and fertility.

FIGURE 10

ALTERNATIVE MODEL OF SUCCESSFUL ECONOMIC AND DEMOGRAPHIC TRANSITION

less uncertainty and higher probabilities concerning survival enable desired family size to be reduced.

Frederiksen identifies three essential differences between the revised neo-Malthusian model and the alternative model.

(1) The neo-Malthusian model views a reduction in mortality as an increase in population growth, whereas the alternative model notes the transitory feature of the 'population explosion' and emphasizes the improvement in health, productivity, and longevity;

(2) The neo-Malthusian model explicitly or implicitly assumes that levels of mortality are not quite independent of levels of living, whereas the alternative model assumes that levels of mortality are still quite dependent on levels of living, although the relative effectiveness of health services increases with increasing levels of living; and

(3) The neo-Malthusian model ignores any dependence of fertility trends on mortality trends, whereas the alternative model assumes that reductions in mortality develop the need and desire for family planning (Frederiksen, 1969: 840).

Based on a cross-sectional analysis of 67 countries and other available empirical evidence, Frederiksen concludes that reductions in mortality are part of the solution, not the cause, of "the problem." Mortality rates were found to vary inversely with levels of consumption and production. Also, declines in mortality were seen as being necessary for subsequent fertility declines. In essence, he concludes that the alternative model represents a much closer approximation to reality than does the neo-Malthusian model.

Given Frederiksen's analysis, he has constructed equations to explain (predict) natural population increase, based on fertility rates, mortality rates, and relative changes in per capita product at constant prices. He thus employs the equations below to illustrate the dynamics of transition.
The relative change in natality \( n \) in year \( t \) is expressed in terms of natality \( n \) and mortality \( m \) in the base year \( o \):

\[
\frac{n_t}{n_o} = \frac{a}{(n_o-m_o)} b^{t-o}
\]

("a" and "b" are constants).

The relative change in mortality \( m \) in year \( t \) is expressed in terms of the relative change in per capita product (at constant prices) \( p \) in year \( t \):

\[
\frac{m_t}{m_o} = \left( \frac{c}{\left( \frac{p_t}{p_o} \right)} d \right)^{t-o}
\]

("c" and "d" are constants).

He then combines the equations for relative changes in natality and mortality, yielding the rate of natural increase \( n-m \) in year \( t \). This rate is expressed in terms of natality \( n \) and mortality \( m \) in the base year \( o \) and the relative change in per capita product (at constant prices) \( p \) in year \( t \):

\[
n_t - m_t = n_o \left( \frac{a}{(n_o-m_o)} b \right)^{t-o} - m_o \left( \frac{c}{\left( \frac{p_t}{p_o} \right)} d \right)^{t-o}
\]

Employing an empirical deviation and constants arrived at in an earlier (1966) study, Frederiksen illustrates the utility of the equation for estimating natural increase in the rate of population for Costa Rica.
As a frame of reference for understanding the determinants of fertility, "theories" of demographic transition seems to be quite lacking. The assumption that demographic trends in present day developing societies will duplicate the historical experience of presently more economically advanced Western societies, appears to be very questionable. As a theory, the idea of demographic transition is far from satisfactory. However, as a general approach, the notion is quite thought provoking. Indeed, the "demographic transition" controversy has led participants and observers to search out and consider a wide variety of factors which might influence components of population growth and change. The following subsection examines numerous empirical efforts to explore the determinants of population growth from a somewhat broader perspective.

Social and Economic Determinants of Fertility

In 1965, Freedman suggested six preconditions under which fertility rates ought to rapidly decline:

(1) significant social development has already occurred;
(2) mortality has been relatively low for some time;
(3) there is evidence that many people, wanting moderate-sized families, are beginning to try to limit family size;
(4) there are effective social networks, transcending local communities, through which family planning ideas and services and other modernizing influences can be disseminated;
(5) there are large-scale, effective organized efforts to disseminate family planning ideas and information; and
(6) new contraceptives such as the intra-uterine devices or contraceptive pills are effectively available.
Given these six preconditions, Freedman predicted an acceleration of fertility declines to levels of 20-25 per 100 in Hong Kong, Taiwan, Singapore and maybe Korea by 1970. Regardless of the accuracy of his estimates, the ambiguity surrounding the six preconditions renders the exercise suspect. Freedman claims that all six are not necessary for fertility decline to take place. Furthermore, the nature of the combination of these elements required for spurring fertility decline is also unknown. However, Freedman does claim that the first four conditions are relevant both to historical demographic patterns and to modern experience. The last two elements are said to pertain specifically to present-day developing societies.

A more rigorous examination of empirical relationships existing between demographic variables and social and economic variables in developing countries has been undertaken by Kirk (1971). He argues that a "new or renewed demographic transition" is occurring in at least some developing countries. He further states, and presents empirical data to support his claim, that "there has been an acceleration in the rate at which countries move through demographic transition from high to low birth rates." Comparing reductions of birth rates now occurring in developing countries with those that occurred in Europe and other countries at an earlier period, he discovered that when the present-day developing countries studied had reached a threshold of a birth rate of 35, the rate of decline in births

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1By 1973, birth rates in Taiwan and Korea had been reduced only to 23.4 (1974) and 28 respectively.
accelerated and fell sharply until it dropped below 25. However, the limited number of cases examined (six developing countries) restricts the ability to generalize from the results.

In a somewhat larger sample of developing countries in the same study, Kirk (1971) discovered that when he controlled for major cultural regions, various socio-economic thresholds could be identified. In the East and Southeast Asian major cultural region he found that:

Of the seven areas clearly in natality transition by 1960-64, Japan, the Ryukyus, Taiwan, Hong Kong, Malaya, Singapore, and Ceylon all had experienced the onset of fertility decline with per capita incomes well below $300, roughly the average level for the onset of fertility decline in Latin America... With the important exception of the Philippines, all countries that reached a per capita income of $200 by 1960-64 were experiencing, or had experienced (e.g., Japan), a rapid fall in the birth rate (Kirk, 1971: 142-143).

Kirk's findings stand in contrast to earlier results presented in a United Nations report (1965: 150). In the United Nations study of social and economic correlates of fertility in 85 high fertility countries (gross reproduction rate of 2.00 or above) no convincing evidence of such thresholds was found. If Kirk's results are to be assumed accurate, then regional differentiation is an important element when considering demographic and socio-economic relationships.

One of the dominant concerns in two of the studies discussed above and a matter of much concern to policymakers in developing societies is the relationship between mortality and fertility changes. It has been argued by some scholars (See Cassen, 1974; Taeuber, 1971) that a reduction in infant/child mortality has a psychological effect on childbearing. Parents are concerned about having surviving children. A decrease in infant/child mortality is considered to be
a strong inducement to lower fertility. Thus, decline in infant mortality is seen, under this perspective, as a necessary but not sufficient condition for fertility reduction. In connection with this point, Cassen (1975: 218) argues that:

The weight of the evidence seems to be that family planning can accelerate fertility decline where other conditions favor smaller families, but cannot initiate it among poor, ill-nourished, illiterate, rural populations subject to high mortality (Davis, 1967; Berelson et al., 1966; and various issues of Studies in Family Planning).

Guzevatyi (1974: para. 24) and Khalil (1973: 16-17) reiterate this point. Frederiksen (1966), however, suggests that a strong impact of infant mortality occurs. According to him, a substantial decrease in infant mortality might by itself be sufficient to reduce fertility, even without increasing levels of income.


Reduction in child death rates does not necessarily worsen the population problem by accelerating the rate of population growth, except in the short run. In Puerto Rico and Taiwan, the reduction of death rates appears to have fostered the significant reduction in the birth rate. In the Philippines and
East Pakistan, the frequency of earlier child deaths in a family is a good predictor of further births. Although a reduction in child mortality may be associated for 10 or 20 years with an increased rate of population growth, this lag in the decline in birth rates may be seen as a logical consequence of the preferred pattern of family formation...

Such propositions must be considered with strong qualifications, however. Detailed analysis of the mortality-fertility linkage has only been conducted in two societies -- Taiwan and Puerto Rico. Schultz (1971: 162) suggests the idea that perhaps a threshold exists below which infant/child mortality must fall before parents perceive the desirability of reducing births. However, the quantitative establishment of such a threshold has thus far proven allusive.

Although evidence of the existence of such a threshold has thus far alluded quantitative verification, Heer's (1966) cross-sectional study of 41 countries found a statistically significant positive association between infant mortality and fertility, controlling for per capita net national product, per capita newspaper circulation, population density, and percentage change in per capita energy consumption. In addition, fertility was found to be more closely related to infant mortality than to any of these other variables.

In her review of empirical studies of the effects of economic development on fertility, Williams (1974) found across a number of individual country studies -- Jordan and Israel (Schultz, 1970); Egypt (Hassan, 1966, 1967); Philippines (Harman, 1970); East Pakistan (Schultz and Da Vanzo, 1970); Taiwan (Schultz, 1973); and Puerto Rico (Nerlove and Schultz, 1970 and Schultz, 1969a) -- that the impact
of infant and child mortality on birth rates was strongly positive. Heer (1966) and Weintraub (1962) obtained similar results employing multiple regression analyses to cross-sectional data sets. In these two studies infant mortality rate was the only variable which produced statistically significant results. Gregory et al. (1972), employing simultaneous equations, found that the impact of infant mortality on birth rate (with a reduced form elasticity of 0.18) was second only to literacy (0.28).

"In summary, the response of births to child mortality is strongly positive..." (Williams, 1974: 28). In addition, at least in the studies of Puerto Rico, the time lag involved appears to be fairly short (one to four years). Several studies have examined the relationship between total mortality and birth rates (Schultz, 1969a; Nerlove and Schultz, 1970; Janowitz, 1971; and Da Vanzo, 1972). The results -- both in sign and magnitude of the coefficients -- are similar to the results discussed above for infant mortality.
In her review of studies which have examined the relationships between income and birth rates, Williams (1974) argues that the results are inconclusive. Whereas some studies (Adelman, 1963; Heer, 1966; and Weintraub, 1962) have found the relationship to be positive, others (Adelman and Morris, 1966; Friedlander and Silver, 1970; and Kirk and Srikantan, 1969) have found the relationship to be negative or insignificant. Again, as suggested above, the question of short versus long-range changes in birth rates brought about by income change could be operating to confuse the results.

From recent international debate concerning the population/development issue and from several recent studies by the International Labor Organization (ILO) the argument has been put forth that more equal domestic income distribution should, itself, be accepted as the "real purpose of development" (Singer, 1974: 515-516; ILO, 1970 and 1971). Beyond this value orientation, though, there is strong support for the need to consider relative income equality in any macro-economic-demographic model. Singer (1974: 515) draws our attention to the observation that "the developing countries with lower birth and death rates tend to be countries with relatively equal income distribution (for example, Barbados, Chile, Cuba, Republic of Korea, Sri Lanka and Uruguay)."

Much of the interest has centered on the relationship between income distribution and variations in fertility. A World Bank Staff Report (1974) found that reductions in fertility are more sensitive
to changes in income at the lower end of income distributions than they are to changes in per capita income in general.

...the elasticity of the general fertility rate with regard to changes in the share of income received by the poorest 40 percent of households, is 0.36; the elasticity of fertility with regard to the increases in average income per capita is 0.20, little more than half as great (World Bank, 1974: 48).

Cross-national studies by Kocher (1973) and Rich (1973) arrived at similar conclusions.

The poorest 40 percent of households in most developing societies account for a relatively small proportion of total income growth in those societies. Yet the impact of population growth is greatest among the poor. A substantial portion of the working age population in developing societies is not part of the regular labor force. Such unemployment is a particularly acute problem confronting governments in these regions. Employment in India, for example, is growing at a much slower rate than is the labor force (National Academy of Sciences, 1974: 16). The increase in structural unemployment and underemployment in the agricultural sector is especially acute.

Singer (1974: 515) draws together many of the positions discussed above concerning the relationships among mortality, fertility, level of income, and other elements into what he terms a "model of the interrelationship between income distribution and population."

A model of interrelationship with population growth in which income distribution and the associated employment factor emerge in a crucial role is as follows: the desire for smaller families and the capacity to translate this desire into action are a function of a minimum level of income; and of those minimum levels of security and expectation of progress and minimum levels of education, literacy, health, nutrition, etc., which are associated with such reasonable minimum levels of income. The bulk of the population in developing countries reaches such minimum levels only if the scarce resources of the country, and the scanty increments arising from their growth, are widely distributed to the bulk of the population...
Translating and extending Singer's somewhat confusing statement, the argument is being made that the attainment of minimum levels of income by a bulk of the populations in developing countries is a necessary condition for fertility decline. Furthermore, given the patterns of income distribution in most developing societies, the examination of per capita income tends to mask important structural characteristics in those societies which are critical determinants of fertility reduction. Singer (1974: 516) also goes on to argue that his "model" is not consistent with various threshold constraints.

In his recent study employing ordinary and two-stage least squares regressions, Repetto (1974) found for a group of 68 countries for which data was available that a consistently strong relationship existed between income distribution (measured by the Gini coefficient) and fertility. In addition, female literacy was found to also be significantly related to fertility.

Other than child mortality discussed above, the strongest and most consistent relationships uncovered by Williams' review were between education (in particular female education) and birth rates and female labor force activity away from the home.

Cross-sectional regression analyses conducted by Adelman (1963), Heer and Turner (1965), Heer (1966), Friedlander and Silver (1963), Janowitz (1971), and Ekanen (1972) have uncovered consistent significant relationships between measures of education and birth rates (fertility). These studies have not directly addressed the question of impact of female literacy. As was mentioned above, however, the
Repetto study (1974) did incorporate female literacy and did find a consistent inverse relationship to fertility.

Longitudinal single country regression analyses (including Heer and Turner, 1965; Drakatos, 1969; Schultz, 1969a, 1969b, 1970, 1973; Intaka et al., 1971; Gendell et al., 1970; and Repetto, 1972) found similar results. Where female educational attainment has been incorporated into the regression models (Schultz in Colombia, 1969b; and Ben-Porath for Arabo in Israel, 1970) significant, strong negative relationships result between female educational attainment and fertility. The male educational attainment coefficient vacillated, however, in sign and significance.

The weakness of male education can be attributed to the relative balance of the two opposite effects of raising wages by education — the higher income leading to more children and the higher cost of those children because of the income forgone when the husband helps rear them. Because the time cost of children is borne largely by the wife, her educational coefficient is more negative than that of the husband. When only adult education or literacy is included, the stronger education effect for the wife and the positive correlation between education of husband and wife yield a consistently negative sign (Williams, 1974: 20).

Whether or not one accepts Williams' interpretation of the findings, the results of the studies indicate a strong negative relationship between educational attainment (especially female education) and fertility or birth rates.

Beaver's (1975) attempt at respecifying demographic theory was briefly mentioned above. Under Beaver's interpretation, the fundamental assumption underlying demographic transition is:

socioeconomic development of a society causes lagged changes in its value system which encourage progressively lower natality over some large range of development (44).
Other important assumptions included in Beaver's presentation include:

Assumption 2: The immediate effect of mortality decline is to raise natality; the delayed effect of mortality decline is to reduce childbearing-parenthood values. (47)

Assumption 3: A secondary effect of a decline in child and infant mortality is to increase the economic strains on families. (47)

Assumption 4: Natality is a direct function of the availability to those who normally have children of those resources defined as necessary for the responsibilities of family life; among the more modernized, urban sectors of society, resources must be measured against expectations that are themselves a function of established standards of living. (49)

Assumption 5: Natality decline is facilitated to the degree that a pre-development culture is predisposed to modernizing influence and has the opportunity for contact with more developed societies. This effect operates by encouraging development and mortality decline, but there may be a direct effect upon natality as well. (50)

Beaver's revised model is represented in Figure 11 below. Nine main hypotheses were formulated and tested, employing partial correlation and regression analyses in data for Latin American societies. The results of the data analysis appear to support the revised model of demographic transition.

As predicted, it was found that the greater the availability of land and the rate of economic expansion, the higher the natality, controlling for the other variables in the model. It was also found that short-term changes in mortality tend to raise natality initially. As anticipated, none of these three effects is as important as the combined effect of development or long-term mortality decline, but all these relationships are reasonably strong by the usual statistical standards. (150)
FIGURE 11
CAUSAL DIAGRAM OF THE INFLUENCES ON NATALITY

Source: Beaver, 1975: 54.
In his analysis Beaver (134-139) experimented with differing time lags. The minimum lags employed in the analysis for the socio-economic and mortality variables were 7.5 to 10 years. Alternative lags of 12.5 to 15 years and 17.5 to 20 years were also employed. In general, the longer lags produced substantially better results than did the shorter lags. The variance in crude birth rates "explained" by seven independent variables\(^2\) increases from 76.7 percent to 82.0 as the lags grow from the minimum to the maximum values mentioned above.

Caution needs to be taken when reviewing the findings of Beaver's multiple regression analysis, however. A zero-order correlation matrix reveals a high degree of multicollinearity among five of his "independent" variables: gross domestic product, percentage of urban population, education, crude death rate, and life expectancy. An examination of the partial correlation coefficients of the seven independent variables with crude birth rate reveal no singularly strong coefficients.

The statistically significant (.01 level) partial coefficients include: percentage urban population (\(-.50\)); crude death rate (\(-.27\)); life expectancy (\(-.42\)); land availability (\(.36\)); and economic expansion (\(.25\)).

\(^2\) These independent variables include: gross domestic product per capita (7\(\frac{1}{2}\) year lag); percentage of urban population (7\(\frac{1}{2}\)); crude death rate; expectation of life at birth (10); education (7\(\frac{1}{2}\)); land -- the natural logarithm of the total land per 1000 rural persons multiplied by the proportion of the population said to be "rural"; and expansion -- the ratio of absolute national product at a given time and its value five years previously multiplied by the proportion of the population said to be "urban". The dependent variables were age-sex standardized birth rate and crude birth rate.
The above discussion has attempted to identify both specific findings from empirical investigations into the determinants of fertility and the intellectual context in which those studies were based. These findings can be clustered into three general categories with reference to the main independent variables considered: income, mortality, and education. These three variable clusters will be reviewed and elaborated on below. However, before proceeding to that task a second major focus of contemporary population literature will be discussed. The following chapter deals with studies regarding the impact population growth and change have on social and economic conditions.
CHAPTER VI
SOCIAL AND ECONOMIC CONSEQUENCES
OF POPULATION GROWTH AND CHANGE

Introduction

Whereas the discussion in the preceding chapter focused almost exclusively on the social and economic determinants of population growth, the main concern of the discussion below is the effects of population growth on social and economic development. Questions regarding such consequences of demographic change lie at the core of the "population debate" referred to earlier. Do changes in size and growth rates of populations have important consequences for the attainment of social and economic development objectives? What is the time frame required for the consequences resulting from such dynamic interrelationships to be fully felt? Is this time period so long as to render fertility control programs and policies ineffective tools for attaining general social and economic development objectives?

A thorough discussion of the consequences of demographic change must consider numerous effects of such change. A World Bank Staff Report (1974: 24-25) differentiates between effects of changes on population growth rates and effects of changes in population size.

Although rates of population growth and size of population are related, it is useful to distinguish between their different effects. The issues revolving around population growth rates turn mostly on the fact that in a high fertility society, the age structure will be younger and the
demands made upon resources to feed, clothe, house, educate, and equip the increasing numbers, will be greater than in a low fertility society. Issues of population size involve analyses of the results of the pressure of a larger population on fixed supplies of land and natural resources.

Studies into the effects of population growth in less economically advanced regions have generally centered around the impact of such demographic changes on the growth of total and/or average income (income per capita). "In general, little is known concerning the interrelations between population and economic growth in these... regions" (United Nations, 1974: 539). Numerous reports by United Nations bodies have asserted that rapid population growth is a hindrance to growth in per capita income. However, most studies conducted by such bodies have been based on data of very limited coverage. In addition, as is the case with most aggregate data analyses employing data from less economically advanced societies, much of the data is of questionable reliability. Thus, even in countries where such studies have been conducted great uncertainty exists regarding the degree of confidence which can be place in the results.

In reviewing the findings of several empirical studies which attempted to trace the association between growth of population and per capita income, a United Nations study conceded the questionable nature of the conclusions stated above. "Although the discussion of regional trends suggests that under given conditions a lower rate of population growth in most developing countries would help their economic development, actual growth trends in developing countries do not provide
evidence of a significant and systematic association between the two within the developing countries" (United Nations, 1974: 541).

Although most of the literature in this area has focused on the effects of population growth on per capita income, the relationship between demographic changes and income equality is also considered by many scholars and practitioners to be of major importance (World Bank, 1974; Sirageldin, 1975; United Nations, 1974). "Whereas some people regard the effect of reduced fertility on per capita income growth as ambiguous, there appears to be as explicit dissent from the view that lower fertility contributes to greater income inequality" (World Bank, 1974: 35). There appears to be no general consensus concerning the exact nature of the interrelationships between population and income equality, however.

Sirageldin (1975: 156) has distinguished among three types of demographic factors that affect income distribution. The first factor, the "pure demographic effect," results from change in the age distribution of a population. Changes in the age-earning profile impact on personal income distribution. In addition, changes in the dependency ratio and in family size affect the earning-expenditure ratio of family units. The second demographic factor is the "social demographic effect." "It is the result of the interaction of demographic variables with changing social, institutional, and political forces, such as changes in marriage, retirement age, family structure, the pattern of
inter-family transfers, inheritance laws, or attitudes toward work and life" (Sirageldin, 1974: 156). The third type, "economic demographic effects," is the impact of population changes on: the potential quality, composition, and distribution of the labor supply; potential aggregate savings; the share of agriculture in total output; and the share of wages in total incomes.

Sirageldin's typology provides an interesting framework with which to examine the relationships between demographic changes and income distribution. However, the complex nature of such relationships makes it extremely difficult portraying the dynamic processes involved. To cope with such complexity, students of such processes have resorted to the use of such tools as general equilibrium models.

The following discussion of the effects of population growth and change on social and economic development examines numerous attempts to employ computer models of economic growth and development processes as tools for understanding such relationships. In addition, several selected models which attempt to incorporate interactive effects among population growth, social change and economic change are examined.

Demographic-Economic Models

Of particular interest to scholars constructing economic growth models has been the relationship of a decline in fertility to subsequent economic growth (Stamper, 1973: 3). This focus has been particularly important to development planning.
The 'first generation' of such models used for planning in the developing countries were very often of the Harrod-Domar variety and assumed implicitly that capital accumulation and technical changes were the only factors that could cause increases in total output. Labor was, in effect, a free good and also had zero marginal product. Population growth affected the economic aggregate only when these aggregates were converted to per capita terms (Robinson, 1975: 15).\(^1\)

The relation of capital to output, \(K/Y\), in the Harrod-Domar growth model is assumed to be fixed. If the reciprocal of the capital-output ratio, \(Y/K\), is represented by \(A\), then the aggregate production function can be represented as:

\[
Y = AK
\]

(Hamberg, 1971: 13).

One of the most famous pioneering efforts employing such a framework was the Coale-Hoover (1958) study of India. The primary purpose of the study was to examine the impact of declining fertility on economic growth. As mentioned in the quote above, the Harrod-Domar production function links the growth of output to changes in the amount of capital and changes in the capital output ratio (Stamper, 1973: 3). The model is employed to project future levels of output. Then, alternative population projections were utilized to examine their effects on per capita income.

Some confusion might arise concerning the use of a model based on a Harrod-Domar production function to test the impact of declining

\(^1\) Such models have been developed by Coale and Hoover (1958), Demeny (1965), Hoover and Perlman (1966), and Hoover (1970).
fertility on per capita income. Population is incorporated in the model only in the most limited and indirect sense. Capital is the single factor of production. Capital is determined through domestic savings. Savings is treated as residue from the consumption function. The consumption function incorporates population in two ways: (1) through "equivalent consumer units" -- a weighted function of the total consuming population, and (2) per capita consumption is defined as a function of per capita income.

Figure 12 illustrates other theoretical relationships between declining fertility and economic growth as they appear in the Coale-Hoover model.

Source: Stamper, 1973: 3.

The upper path in the model represents the short-run benefits of declining fertility and its impact upon dependency ratios and investment.

A decline in fertility immediately begins to reduce the proportion of young dependent persons in the population. A reduction in the dependent, nonproductive population frees
capital that otherwise is spent for the maintenance of this population. This raises the savings and investment potential at both the micro and macro levels. Not only does the potential for a higher level of investment increase when fertility declines, but capital may be put to more directly productive uses... The model assumes the decline would level off in twenty-five years. Thus, the benefits would also level off when the model reaches equilibrium, that is, the stabilization of the age structure (Stamper, 1973: 3-4).

The bottom path in the model represents the longer-run impact of fertility decline. After a fifteen year time lag the size of the labor force declines accordingly. As the size of the labor force declines, more capital can be invested per worker. Increase investments can raise the capita output ratio and the productivity per worker. Because a larger proportion of the population is in the labor force age group and the amount of capital per worker is higher, increased income per capita is possible.

Coale and Hoover (1958: 261-283) assume that the main determinant of the rate of development is the allocation of national output to the combined category F, of public outlays plus private investment. The amount of such funds available is determined by national income, Y, and the level of average income per equivalent adult consumer, Y/C. Equation 1 presents the determination of F in symbolic terms.

\[
F = C \left( \frac{F_o}{C} + a \left( \frac{Y - Y_o}{C_o} \right) \right)
\]

or

\[
F = aY - \left( \frac{aY_o - F_o}{C_o} \right) \frac{C_o}{C}
\]

Total public outlays plus private investment, F, is subdivided into two categories — "direct growth" (D) and "welfare" (W). "Direct
growth" represents those outlays which equip active producers. "Welfare" outlays are those which serve the welfare of the population as a whole, and thus have a delayed effect on output. Equation 2 illustrates this relationship.

\[ F = D + W \]

In turn, welfare is subdivided into two parts: outlays to meet current needs of the population \((W_c)\) and outlays required to provide facilities for additional people \((W_i)\). This subdivision is represented symbolically as:

\[ W = W_c + W_i \]

Coale and Hoover arbitrarily assume that ten times as much \(W_i\), as compared with \(W_c\), is required to establish initial provision for one additional person; thereafter an outlay of \(W_c\) is required to sustain that additional person. This "capital/output ratio" in welfare is represented as:

\[ \frac{W_i}{W_i} = 10p, \]

where \(p\) is the annual rate of population growth.

An additional assumption is that, as levels of living rise (in India), the standard of "requirements" for \(W_c\) outlays also rises. These outlays are assumed to absorb a "constant" percentage (7.25 percent) of income throughout the time period examined.

\[ W_c = \left( \frac{(W_c)}{Y_o} \right) Y = .0725Y \]
Substituting these assumptions into the equations above, we have:

\[ W_1 = 10_p W_c = .725pY \]

and thus,

\[ W = .0725Y (1 + 10p) \]

As was stated above, welfare \((W)\) outlays in the model have a much weaker effect on \(F\) than do direct growth \((D)\) outlays. Therefore, fractional weights \((e_c\) and \(e_1)\) are assigned to \(W_c\) and \(W_i\) respectively before combining them with \(D\).

We shall at the same time try to take account of the fact that these are essentially outlays for consumers, and that their effects on productivity are diluted or delayed to a greater extent if a greater proportion is earmarked for children or other dependents. We propose to allow for this by thinking of the 'W' outlays as pro-rated among the whole population, and attributing to the 'labor force's pro-rated share' a productivity effect that is just as prompt as that of direct growth outlays; while the remainder of the 'W' outlays is assumed to affect output only after a 15-year lag. In the case of 'W' outlays occasioned by children... a long lag of this character is obviously involved; we believe that a great many of the benefits of other types of \(W_c\) outlays going to non-members of the labor force can also reasonably be assumed to contribute to national productivity in such indirect and complex ways that the full effect is not felt within the decade (p. 267).

The resulting formula for "equivalent growth outlays" \((G)\) is represented as follows:

\[ G = D_t (e_c W_c + e_i W_i)_L \cdot t(e_c W_c t e_i W_i)_{t-15} (1-L)_{t-15} \]

where "L" is the ratio of labor force to population.

The next step in the model is to assign a quantitative measure to the relation between equivalent growth outlays \((G)\) and the subsequent increase in national income. Since population projections are determined on a five-year basis, it is assumed that the amount of \(G\) outlay
for any $2\frac{1}{2}$-year interval determines the rise in income over the next interval. Population projections are then derived by simple interpolation between five-year estimates.

The following equation illustrates this relationship:

\[
(7) \quad Y_{t+2.5} = Y_t + \frac{2.5G}{R}
\]

where $R$ represents the ratio of $G$ outlays in any year to the amount by which the annual rate of $Y$ increases in the ensuing $2\frac{1}{2}$-year interval (as stated above). The ratio between $G$ and the resulting increment in $Y$ was initially assumed to be 3.0, with a steady 0.02 per annum increase over time. Thus, the capital/output ratio is represented as:

\[
(8) \quad R = m + nt
\]

and, thus, given the just-stated assumptions:

\[
R = 3.0 + .02t
\]

Figure 13 illustrates the Coale and Hoover model in schematic form.
In this model fertility decline is assumed to be determined exogenously. Capital is assumed to be the single factor of production and is determined through domestic savings. Savings represents that part of income which is not consumed, and is represented as a residual of the consumption function. The consumption function includes demographic considerations in two ways. The variable, "equivalent adult consumers," is a weighted function of the total consuming population. In this measure population is adjusted by the following assigned weights: children under ten years of age (were assigned a weight of 0.5), females ten years and older (0.9), and males over ten years of age (1.0). Secondly, population is also incorporated to the extent that per capita consumption is defined as a function of per capita income. Population also is included in the model through the impact of the ratio of labor force to population on equivalent growth outlays.

Growth models based on Harrod-Domar production functions have numerous limitations. Robinson articulates one limitation as follows:

Such models can be said to have employed population illustratively, not substantively or analytically. They made no effort to show the effects of population growth on the year-by-year process of economic growth through its effect on relative factor prices, public investment decisions, consumption requirements, and the like. They showed, in effect, that if population has nothing to do with producing output, a smaller population is better than a larger population (Robinson, 1975: 15).

Thus, since output is not treated as being a function of labor, such models are not of much utility for going beyond an examination of the effects of fertility decline on income per capita.
In part to compensate for the above criticism a "second generation" of models generally employing the Cobb-Douglas production function, were constructed. Output is based on an aggregate function, including capital, labor, natural resources and technology. Such a function yields positive but diminishing returns to additional inputs of units of productive factors.

As stated above, the Harrod-Domar production function is characterized by fixed coefficients. In contrast the Cobb-Douglas production function, employed in "neoclassical growth models" is characterized by a continuous set of alternative capital-labor ratios, and thus capital-output ratios (Hamberg, 1971: 37). The Cobb-Douglas production function has the form of:

\[ Y = K^\alpha L^{1-\alpha} \]

Where \( Y \) is output, \( K \) is the input of capital stock, \( L \) is the input of labor, and \( \alpha \) is a positive constant (\( \alpha < 1 \)). The constants \( \alpha \) and \( 1-\alpha \) are the output elasticities of capital and labor respectively. Cobb-Douglas is an aggregate, linear homogeneous production function. In other words, it exhibits the property of constant returns to scale. Thus, if the inputs, \( K \) and \( L \), are both increased in the same proportion, then output will likewise increase in the same proportion. For example,

\[ (\lambda K)^\alpha (\lambda L)^{1-\alpha} = \lambda \alpha K^\alpha L^{1-\alpha} = \lambda K^{\alpha} L^{1-\alpha} = \lambda K \]

(Hamberg, 1971: 38).

The Cobb-Douglas production function is also characterized by an elasticity of substitution between capital and labor equal to unity.
The elasticity of substitution relates proportional change in the ratio of the factor inputs to a proportional change in the marginal rate of substitution between capital and labor. Thus, the case of substitution between capital and labor can be determined. In addition, the elasticity of substitution influences the relative income shares received by capital and labor.

This "second generation" of models, known as "neoclassical models," allows the operator to examine the impact of population growth and change on factor proportions and on the technology employed (Robertson, 1975: 16). Numerous researchers have constructed such models. These include: Newman and Allen (1967); Ruprecht (1967); Enke and Zind (1969); Lloyd (1969); and Robinson and Horlacher (1971).

The following figure illustrates a schematic of a generalized macro-economic growth model (United Nations, 1974). This generalized structure is presented as a rough representation of the overall structure employed in a great many of the macro-economic models. In fact, except for the inclusion of a Cobb-Douglas type production function, the model structure is general enough to include the Coale-Hoover model discussed above.

In the flow-diagram total output is a function of three factors of production: Capital (K), Labor (N), and Technology (T). The resulting production function can be represented as follows:

\[ Y = F(K, N, T) \]

It should be noted that this production function is an aggregate function. Any specific model may differ in the precise composition
FIGURE 14

SCHEMATIC OF GENERALIZED MACRO-ECONOMIC GROWTH MODEL

of this function. The simplest forms of the function include only capital; others include much more sophisticated functions, such as Cobb-Douglas production functions.

Capital stocks result from accumulated domestic savings, which is that part of income not used for consumption. "Population and its components influence total output in these models in two ways, through capital and labor" (United Nations, 1975: 480). Population influences capital by means of the consumption function:

\[ C = aY + bP^* \]

Consumption is thus expressed as a function of income (Y) and the "equivalent consumer population" (P*) (Coale and Hoover, 1958: 88, 238). As can be detected from the above equation, the consumption function is usually linear. Savings can therefore be represented as:

\[ S = Y - C. \]

As was also mentioned above, savings is an increment to capital. Thus,

\[ \Delta k = I = S. \]

Population also influences total output through labor. The supply of labor is determined by the age-sex specific labor-force participation ratio:

\[ L = \left\langle \left\{ P_{mi}P_{mi} + P_{fi}P_{fi} \right\} \right\rangle \]

In this equation "P_{mi}" and "P_{fi}" represent the male and female labor force participation ratios of the ith cohorts P_{mi} and P_{fi} respectively.

\[ ^2 \text{Again, it should be noted that not all models include labor in the production function.} \]
Given large surplus labor in most developing societies, it is also important to include an equation for unemployment (assuming labor is used in the production function). "The relationships between labour force, capital stock and unemployment can be expressed as follows:

\[
\frac{\Delta N_t}{N_t} = h \frac{U_t}{U_0},
\]

\[
\frac{\Delta K_t}{K_t} = \frac{U_t}{U_0}
\]

where 'N_t' is employment; 'K_t' is capital stock; 'U_t' is unemployment rate in period 't'; and 'h' is a constant" (United Nations, 1975: 481).

Ruprecht's (1967) Demographic-Econometric Model of the Philippines provides an example of these second generation models. The heart of Ruprecht's model is tied to an aggregate Cobb-Douglas production function:

(1) \[ \text{GNP} = A L^w K^x N^y T^z \]

where L, K, and N represent land, capital and labor respectively; T represents time; w, x, y, and z are exponents; and A is a statistical constant. "The remainder of the model is designed to yield estimates of these inputs' (Ruprecht, 1967: 99). Land, labor and capital are all tied to underlying population projections.\(^3\)

The land input estimates depend upon population in the sense that they are functions of consumption demand as measured by the number of consumers. The rate of increase in the number of consumers is derived from the population projections by converting the population numbers to male adult equivalent consumer units on the basis of a set of age-sex consumption weights. Two

\(^3\)These are five-year projections based upon an assumed age-specific pattern of mortality and fertility changes. For an elaboration of the determination of these projections, see Ruprecht (1967: 99) and Lorimer (1966: 200-314).
land projections thus result in which land is a positive function of population pressure. The projections were made by averaging the absolute land values required to maintain the existing average harvested crop area per male adult equivalent consumer unit and the values calculated on the basis of the average historical expansion in harvested crop area. This procedure was continued until the extensive land margin was reached at an estimated 12.0 million hectares after which growth is constrained to a constant 100 thousand hectares per year as a result of the exploitation of the intensive margin until an absolute maximum was reached at 14.2 million hectares (Ruprecht, 1967: 100).

Total savings is an aggregate of savings in the corporate business sector \( (S_B) \), the household sector \( (S_H) \), and the government sector \( (S_G) \). These three savings sectors are determined (symbolically) as follows:

\[
(2) \quad S_B = f(GNP);
\]

\[
(3) \quad S_H = GNP_D - C,
\]

where \( GNP_D \) is disposable income and \( C \) is consumption;

\[
(4) \quad S_G = R - E_c,
\]

where \( R \) is total government revenue and is a function of \( GNP \) and \( E_c \) is government current expenditures. Government current expenditures is broken down into education and health \( (E_{Ed}) \), and other \( (E_{Co}) \).

Thus,

\[
S = S_B + S_H + S_G
\]

and

\[
I = S.
\]

This amount is then adjusted for depreciation and inventory, as required by the production function.
Population enters the savings model at a number of locations. "It enters the business savings function in that the coefficient is influenced by the unlimitedness of labor supply. It enters the household saving equation through its influence on consumption and the government saving equation through its impact upon education and health expenditures" (Ruprecht, 1967: 102). Labor inputs are determined directly from population projections.

In this analysis population is seen to affect output per head through its influence on the output numerator as well as the population denominator. Population enters the determination of the GNP numerator directly through its influence on the size of the labor input and indirectly through its influence on capital via savings and land via its role in determining land expansion.

The operating model computes annual estimates of: GNP, rate of growth of GNP by source, savings by sector, capital stock, consumption, gross investment, net investment, and other relatively less important qualities. "In computing the annual percentage changes in inputs, the following time considerations hold:

\[
\frac{I_t - I_{t-1}}{I_{t-1}}, \quad \frac{N_t - N_{t-1}}{N_{t-1}}, \quad \frac{K_{t-1} - K_{t-2}}{K_{t-2}}, \quad \frac{T_t - T_{t-1}}{T_{t-1}}.
\]

(Ruprecht, 1967: 102).

Figure 15 on the following page presents a schematic representation of Ruprecht's model.

Another trend in the development of demographic-economic models has been the construction of "investment models." This approach, simply put, involves a modified form of cost-benefit analysis of programs designed to reduce fertility. Robinson and Horlacher (1971)
FIGURE 15

GENERAL SCHEMATIC OF RUPRECHT'S MODEL
provide a fairly comprehensive review of those studies which attempt to weigh the costs and benefits of demographic investment against alternative investments. Attempts at such cost-benefit analysis include: Meier (1959); Enke (1963, 1966); Phelps (1966, 1968); Ohlin (1967); Zaidan (1968); Zaidan and Hawkins (1968); and Fox (1969).

In general, investment models have served as tools to examine the relative costs and benefits of alternative programs designed to increase levels of living (per capita income in most cases). In most cases the relative benefits derived from alternative investments are determined by examining the relative effects that these investments have on per capita income levels.

In an early study Enke (1957) examined the relative impact of alternative development policies on per capita income. The effects of investments in industrialization and urbanization were compared to investments in agriculture, which were assumed to be linked to pressures from population growth. Later studies focused more directly on the relative benefits to be derived from population programs. These studies attempted to determine the net benefit to society from the prevention of a marginal birth. As was stated above, "net benefit" has usually been operationalized as changes in per capita income. In very general terms the findings of these studies have typically been a two or three-fold increase in per capita income as the result of low versus high fertility.

Robinson (1975: 554) suggests that such "investment" studies are based on some combination of the following assumptions:
(a) the marginal productivity of labour is low and falling, so that persons born today will consume for their subsistence more than they produce;

(b) savings are a function of per capita income, not of aggregate income; and in consequence, other things being equal, the larger the population the smaller the savings;

(c) the volume of social welfare services supplied by the government... is related to size, growth rate and age distribution of the population in such a way that the higher the growth rate, the larger the absolute volume of such services that will be supplied;

(d) technological change is in no way related to population growth or pressure, so that future improvements in economic efficiency will flow mainly from current levels of capital investment.

After discussing the empirical evidence regarding these assumptions, Robinson (1975: 554) concludes that "the evidence on most of these points is at least mixed and it is not clear that these assumptions fit all countries of the developing world." A symposium paper issued by the United Nations Secretariat (1975: 479-480) provides additional discussion of numerous difficulties involving this approach.

Almost all of the models considered above have an important characteristic in common. Population is considered solely as an exogenously determined parameter. A few models, however, have included population as an endogenous variable. Leibenstein (1954, 1957) and Nelson (1956) do so in their model of economic development.

This model, based primarily on Malthusian assumptions, describes a phenomenon termed "low-level equilibrium trap" which might occur at subsistence levels in low-income countries. "The mechanics of this model... arise from the shapes of the curves of the rate of growth of population and rate of growth of income, each of which is defined

In very simplified terms, at below subsistence levels of income the rate of growth of population spurred by an increase in income will tend to exceed the increase in per capita income that began the disturbance in the traditional equilibrium level of income. This "low-level equilibrium trap" thus is the result of income depressing counter forces (such as those caused by pressures of population growth) which are set in motion by the initial increases in income. However, it is argued that a certain critical level of per capita income exists beyond which the curve of the rate of growth of population turns downward and eventually drops below the rate of growth of the income curve. In order to escape from the quasi equilibrium of this low-level income trap, the critical level must be exceeded.

As was stated above, population is included endogenously in the model, and population growth is regarded as a function of levels of living. Mortality is treated as being negatively related to income. There are numerous determinants of fertility. However, the desire for larger families predominates up to a point. Once that point is reached, fertility is negatively related to income.

Also in the model Leibenstein has incorporated utility functions for determining additional births into a household. Three general types of utility functions were included: children as consumer goods (personal satisfaction to parents), children as productive agents (contributions to family incomes), and children as potential sources of security (social security for parents in later years). In
situations where displacement (e.g., technological progress, increase in capital, and so forth) is such that decreasing utility and increasing costs for additional births take effect and are realized, fertility will decline and population growth will slow down. In such cases, economic development is progressing.

Figure 16 illustrates an interpretation of the basic relationships incorporated in this Leibenstein model.

*The rate of savings in the model is not explicitly treated as being a residual of the consumption function. Instead, rate of saving is considered a function of previous per capita income levels and change in net national income. The relationships between output and population growth are treated similarly.

FIGURE 16
SCHEMATIC OF LEIBENSTEIN MODEL

In order to give the reader an idea of the workings of the model consider the effect of investment on population growth.

The greater the rate of investment (or savings), the less the absolute amount of consumption; but the greater the rate of investment, the greater the increase in per capita income from which we might expect a greater absolute consumption level.
Which effect will predominate? This depends on the capital output relation. As long as the adjusted incremental capital-output ratio is greater than unity, the amount of the decrease in consumption, as a consequence of a unit increase in investment, will always be greater than the increase in consumption out of the increased income. Therefore, every increase in investment implies a decrease in consumption and a mortality rate higher than otherwise, hence a decrease in the rate of population growth (Leibenstein, 1957: 203).

Although Leibenstein should be heralded for his endogenous treatment of population, his model has been criticized as being too mechanical and not realistically portraying conditions existing in many developing societies today (see United Nations, 1974: 478).

After reviewing the various macroeconomic growth models, Robinson (1975: 17-24) calls for the development of an interactive macroeconomic-demographic model. Such a model, termed a "development model" by Robinson, would consider both demographic effects on economic variables and the effects of economic variables on demographic variables. Emphasis in such a model is placed on the balance between population growth and capital accumulation. In contrast, strict growth models are concerned primarily with the balance between savings and investment, with only minor concern given to population growth (Jorgenson, 1961: 277).

Robinson's (1975: 18-24) attempt to construct an illustrative development model is presented in Figure 17. The model contains a separate demographic submodel which indicates "the determinants of population size, the proportion of the population in labor force ages, labor force participation rates, birth rates, death rates, and the impact of government expenditures on births and deaths" (Robinson,
FIGURE 17
AN INTERACTIVE ECONOMIC-DEMOGRAPHIC MACRO MODEL
1975: 18). He also incorporates a neoclassical growth model in the form of the following Cobb-Douglas type production function:

\[ Q_t = \phi F_t L_t^\alpha K_t^\beta J_t^\gamma \]

where \( Q \) = production in value units; \( F \) = units of technical change; \( L \) = labor input in efficiency units; \( K \) = capital input in value units; \( J \) = resources input in physical units; and \( \phi, \alpha, \beta, \) and \( \gamma \) being constants.

Population enters the model in numerous ways. As illustrated in the equation above, production is a function of labor force. Labor force is a function of the size and age distribution of the population, output per capita, and the participation rate. This relationship can be summarized as follows:

\[ L_t = L Z_t^{\frac{Q_{t-1}}{P_{t-1} R_t}} \]

where \( Z \) = population over age 14; \( P \) = population in equivalent adult consumers; \( R \) = labor force participation rate, and \( t \) = time.

Population is a function of birth and death rates. In computing age specific population the following relationships were specified:

1. \( Z_t = \sum_{i=15}^{75} H_{it} \) where \( H_{it} \) = persons in the \( i \)th age class;

2. \( H_{it} = B_{it} - \sum_{x=t-i}^{t} D_{it} \) where \( B \) = births; and \( D \) = deaths in \( i \)th age class;

3. \( B_t = \sum_{i} b_{it} H_{it} \) where \( b_i \) = age-specific birth rate for the \( i \)th age class;
(4) \( b_{it} = b_1 (b_1^{lG_4}, Q_t, Z_t) \) where \( b_1^{l} \) = initial age-specific birth rates; and \( G_4 \) = government expenditures for family planning programs;

\( (i=0...n) \)

(5) \( D_{it} = d_i H_{it} \) where \( d_i \) = age-specific death rates for the ith age class;

(6) \( d_{it} = d_1 (d_1^{l}\frac{Q_t}{P_t}, \bar{H}, t) \) where \( d_1^{l} \) = initial age-specific death rates; and \( \bar{H} \) = average government welfare expenditures per equivalent adult consumer.

Population in equivalent adult consumers (\( P \)) was computed as a function of the summation of age-specific consumption as a percent of adult consumption (\( w_i \)) and the number of persons in each age class:

\[
P_t = \sum_{i=1}^{n} w_i H_{it}.
\]

Labor force participation rate (\( R \)) was defined to be the following equality:

\[
R_t = R(\sum_{i=1}^{n} H_{it})
\]

In two other relationships in the model population plays an important role. Savings is a function of population as well as income:

\[
S_i = J \left[ (Q_i - T_i), P_i \right]
\]

where \( T \) = taxes. Also, government spending on welfare is computed as a per capita variable. Thus, such spending is directly affected by population growth. Increased spending on welfare decreases tax revenues available for other government programs.
Robinson (1975: 19) suggests that these relationships would be incorporated in most interactive demographic-economic models. However, he acknowledges that some of the key relationships have yet to be demonstrated with empirical research. These relationships include those between savings and population growth, female labor force participation and fertility (implicitly included in the model), and government spending on family planning and fertility.

Several other such interactive macro demographic-economic models have been developed. Among numerous such models in various stages of construction, two will be discussed briefly below. These are the BACHUE model of the International Labor Organization and the "Limits to Growth" model developed at Massachusetts Institute of Technology.

The model building efforts of the International Labor Organization involve the construction of both a generalized model (BACHUE-1) and country-specific models of demographic-economic systems. The International Labor Office (1975: 211) has identified three main distinguishing characteristics of the BACHUE-1 model. The model is highly endogenous. Various elements of the model from fertility and death rates to productivity growth and final demand patterns are determined within the model. The model is highly disaggregated. Population is represented according to age, sex, rural-urban location, and educational attainment. The economic sector is similarly highly disaggregated. Lastly, the model includes representations of both modern and traditional sectors.

For a brief review of eleven such models including the General Electric Company's TEMPO model, see Carter, 1974: 222-231.
The model consists of three main subsystems: economic, educational, and demographic. Table 25 presents the main feedbacks between and within the three subsystems. In the demographic sector births, deaths, migration and labor force participation are classified by age, sex and location. The elements of this subsystem are treated as a set of accounting identities. Births in any given year are a function of the average total number of births that fertile women are likely to have. This average actual number of births is composed of two elements: planned number of births and uncertainty. The rationale for including the planned number of births component is based on the ideas of children as durable consumer goods and investment goods. "Explanatory variables retained are mortality rates, average educational level of adults and of children, opportunities for women to work in the modern sector, proportion of unpaid family workers in the labour force and the average household income" (International Labour Office, 1975: 212).

The uncertainty component represents the extent to which family planning practices are effective. Other than through the use of contraceptives, it is assumed that effectiveness of reducing births increases through delay in marriage and/or increasing educational attainment of women. Uncertainty can also be reduced through the introduction of contraceptive technology.

5 The following discussion of specific characteristics of the BACHUE model is taken from International Labour Office, 1975: 212-215.
TABLE 25
MAIN FEEDBACKS AMONG THREE SUBSYSTEMS
IN THE BACHUE-I MODEL

| Dependent variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|---------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Population          | x | x |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Death rates         |    |    | x |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Birth rates         |    |    |    | x |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Propensity to migrate|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Desired number of children |    |    |    |    |    |    | x |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Uncertainty component |    |    | x |    |    |    |    |    | x |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Age at marriage     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Labour force         |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Labour force participation rates |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Population related variable |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Educational attainment |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Income              |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Investments         |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Value added by sector |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Imports             |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Productivity in modern sectors |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Employment in modern sectors |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Employment in traditional sectors |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Productivity in traditional sectors |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Employment-related variables |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Households income   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Foreign exchange     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Foreign currency reserves |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Capacity of production |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

*The origin of government revenue—constituted of inputs of productive sectors, import duties and direct and indirect taxes—has been skipped.

Age, sex, and location specific death rates are derived in the model from life expectancies. Life expectancies are assumed to increase (toward developed country levels) as average household incomes increase.

Rural to urban migration rates are determined with regard to the migration of working-age males.

The propensity to migrate is a function of four variables: (1) the rate of growth of the modern-sector urban jobs; (2) the ratio of rural to urban household income; (3) the average educational level of working-age rural males; and (4) a weighting factor (derived from the gravity model of migration) which adjusts the rate of migration obtained from the other variables (International Labour Office, 1975: 213).

The educational subsystem also represents a set of accounting identities, which identifies participants in the educational system past and present. Each five-year age-sex-location cohort is classified according to highest level of educational attainment. Educational attainment is considered to be a function of death rates, migration rates, and enrollment, drop-out, and success rates. Enrollment, drop-out and success rates are related to levels of household incomes.

The economic subsystem is basically an input-output model with built-in supply constraints. The subsystem consists of seven production sectors: agriculture, consumer goods, capital goods, construction, trade, transportation and services. In addition, distribution of household income by size of income is derived in the subroutine.

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An algebraic representation of the economic subroutine of the BACHUE-1 model is presented in International Labour Office, 1975: Annex I, 216-220.
Beginning with final demand for domestic production by production sectors, sector output levels are computed. Sectoral value-added is derived from the gross output levels; and, lastly, sectoral employment is calculated on the basis of the sectoral value-added and estimates of labour productivity. The employment and production levels for each sector form the basis for estimates of household income distribution. The income of these groups is either taxed away, saved or consumed -- completing the circular flow of income and production (International Labour Office, 1975: 213).

A more specific accounting of the numerous relationships incorporated in the economic subsystem can be obtained from Table 25 above.

The following discussion will focus almost exclusively on the demographic related aspects of the subsystem.

Sector specific final demand for domestic production is computed as the sum of urban and rural household consumption. Such consumption is defined according to size of income, investment by households, enterprises and government, government consumption, and net demand for foreign trade. Household consumption is determined by household income and the number and ages of household members. Demand for investments from households and government is assumed to be sensitive to population growth, number of households and urbanization. Government consumption is a function of changes in government revenues, total population and urban portion of population.

Sector specific employment in modern sectors is a function of value-added and labor productivity, the former being divided by the latter. Labor productivity is a function of labor availability, educational level of working-age population and corporate investment.
Sector specific employment in traditional sectors is treated as a fixed proportion of the available labor force. Those members of the labor force not employed in modern sectors are considered to be employed in the traditional sector. Thus, no unemployment is permitted in the model.

The BACHUE-1 model, and subsequent country specific models based on BACHUE-1, provide an important thrust toward the more sophisticated development of interactive "development" models, as suggested by Robinson. The ILO model was initially developed with an important link to the "Limits of Growth" model to be discussed next. BACHUE-1 was, at first, programmed in Dynamo computer language. This language is based on Systems Dynamics and is the language employed for constructing the "Limits to Growth" model. However, because of certain difficulties, BACHUE-1 has been reprogrammed in Fortran language.

The "Limits to Growth" model ("World 3"), developed at the Massachusetts Institute of Technology (MIT) under the leadership of Dennis Meadows (1972; 1974), represented an attempt to build upon the earlier world modelling effects of Jay Forrester (1971). Forrester's model, technically termed "World 2", consisted of four key variables: population, capital stock, natural resources and pollution. Another variable, capital investment in agriculture, was also included. This variable determined the amount of food produced. "There are a large number of intuitively specified links between the five variables,\

For a brief discussion of these difficulties, see International Labour Office, 1975: 212.
most of which have little or no effect on the workings of the model, unless certain extreme assumptions are made to activate them" (Carter, 1974: 224).

The "World 2" model has been criticized on numerous grounds. Among the more damaging criticisms is the assumption that the relationships among the variables possess the characteristic of being reversible. In other words, the functions specified in the model work in both relations. Carter (1974: 224) argues that, given the present level of understanding (documented by empirical studies) of how various physical, social, and economic elements in the environment interrelate, such an inherent assumption is very questionable. Another major criticism is the lack of operational linkages in the model. "There are many apparent links from the population section to the capital investment and natural resources parts of the model; but in actual model practice, these links are either self-cancelling, or negligible" (Carter, 1974: 225).

In light of these and other criticisms of "World 2", another MIT based research group led by Dennis Meadows undertook the task of refining Forrester's model. The results of this group's work was the construction of the "Limits to Growth" model, technically termed "World 3".  

There are five basic sectors in the "World 3" model. These include: population, capital, agriculture, nonrenewable resources and

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8 The structure of this model is documented in Meadow's et al., The Dynamics of Growth in a Finite World (1974).
pollution. The "Limits to Growth" model is similar in nature to "World 2". Carter's (1974: 225-226) criticisms of these models are, therefore, not dissimilar. With reference to "World 3" he argues:

The population system has weak inputs from the capital and resources system; but the equation links from population to capital and resources, although existent, virtually cancel out the effects of these variables. There is, thus, an essentially self-generated capital stock whose growth is determined by the parameters chosen for it and whose end comes when natural resources are so depleted as to require the diversion of capital to resource extraction rather than to making new capital. Eventual collapse has thus been built in, regardless of what happens to the rest of the model (Carter, 1974: 225-226).

Figure 18 illustrates schematically the most important interactions among the five main sectors of "World 3." The five sectors depicted have each been represented in the model at a fairly high level of aggregation. The model represents one homogeneous world system. Population is only partially disaggregated by age. Capital is differentiated into four categories: industrial, service, agriculture, and resource extraction. Land is divided into: arable, potentially arable, and urban-industrial. The pollution and resources sectors are not disaggregated.

The direction and sign of the relationships in the model were first determined by what Meadows et al. term "structure assumptions." These assumptions expressed the general causal links among the various elements in the model. Such assumptions are represented in system dynamics by causal-loop diagrams. Figure 19 represents a causal-loop diagram of several important feedback loops in the "Limits of Growth" model.
Source: Meadows et al., 1974: 11.

FIGURE 18. INTERACTIONS AMONG THE FIVE BASIC SECTORS OF WORLD3
In the causal-loop diagram the arrows represent the influence of particular elements on other elements. The + or - signs represent the polarity of the relationship in question. Positive polarity denotes a situation where an increase (decrease) in one element produces an increase (decrease) in the other element. Negative polarity indicates that an increase (decrease) in one element produces a decrease (increase) in the other element.

Two important feedback loops in World 3 produce the potential for exponential physical growth in the model system. The first governs human births; the second determines investment in industrial capital. In the first loop an increased number of human births increases the population, and the greater number of people then leads to still more births (after a 15-30 year delay required for newborns to mature and bear their
own children). Similarly, an increased rate of capital investment adds to the stock of industrial capital, which makes possible a greater industrial output. Increased output, in turn, permits more investment, which raises the stock of capital still higher (Meadows et al., 1974: 15).

These two positive feedback loops are "balanced" in the model by the negative feedback loops involving economic and environmental elements. Physical limits are answered to affect interactions related to the agricultural, resources, and pollution sectors.

Structural assumptions do not provide enough information for operating the model on the computer, however. "Parametric assumptions" are also required. These assumptions specify the quantitative relationships among the elements. In the construction of "World 3" much less emphasis was placed on parameter estimation relative to structural concerns.

Systems dynamics places primary emphasis on determining... model structure, rather than on estimating numerical parameters, for three reasons. First, experience in modeling feedback rapidly demonstrates that even the most sophisticated numerical estimation techniques will not produce useful conclusions from a faulty or incomplete model structure. Second, system dynamics models are usually concerned with imprecise questions about the general behavioral tendencies of social systems. Third, a correct causal structure generally produces realistic model behavior, even with only approximate numerical parameters. (Meadows et al., 1974: 21).

Population is the key sector in the "World 3" model. The interaction between population growth and change and resource supply lies at the heart of the model. Population has two main functions with reference to the supply of resources. First, total population size is one determinant of resource supplies. Second, population responds through birth rate and death rate to changes in supplies of resources (Meadows et al., 1974: 30).
Focusing primarily on the population sector of the model, Figure 20 illustrates the major feedback loops involved.

Numerous assumptions underlie the relationships depicted in the causal-loop diagram. These assumptions include:

1. The number of births each year is a function of the number of women of reproductive age in the population and the average probability of each woman giving birth that year (the average fertility).

2. The number of deaths each year is a function of the total number of people in the population and the probability of each person dying that year (the average mortality).

3. Average fertility depends on involuntary factors (maximum total fertility, or fecundity), voluntary factors (desire for a given average number of children), and the means available for achieving the voluntary goal (fertility control effectiveness).
4. Maximum total fertility (fecundity) is limited by the same factors that limit the general health of a population, especially the availability of health services and food.

5. Average desired family size is determined in part by the prevailing social norms with regard to families and in part by the average individual's response to those norms.

6. Any society's family size norm depends upon a complex of cultural and environmental factors that influence the perceived social and economic advantages and disadvantages of childbearing. Since any change in this norm must be endorsed by the society as a whole, the social norm shifts gradually, rather than quickly, as the environment changes.

7. Individuals and families do conform to the norm expected of them by society, but only to the extent permitted by their own perceptions and expectations of their personal resources for bringing up children. These expectations may shift relatively quickly.

8. Under conditions of a high perceived child mortality, families will produce extra children beyond the number ultimately desired to compensate for the risk of losing children.

9. Effective, low-cost methods of fertility control will be developed by a society if there is a perceived need for such methods and if sufficient economic resources are available to invest in developing them. In every society—even the most primitive—effective, but high-cost, fertility control methods are already available.

10. The average mortality of a population is also a function of involuntary factors, voluntary goals, and the means to attain those goals.

11. A goal of every human society is to keep its own mortality as low as possible. Therefore, there is always a recognized need for mortality control.

12. The primary mortality control methods are public health and medical technologies and improved means of food production and distribution. All these methods also require the investment of scarce resources from the economic system.
13. Possible factors influencing involuntary mortality are pollution, crowding, and lack of food. (Meadows et al., 1974: 50-51).

Population growth, itself, is employed mainly as an accounting mechanism for computing levels of per capita industrial output, per capita service output, per capita food, crowding and pollution. Population growth is controlled by two primary feedback loop systems. One system resolves around fertility, increasing population size. The other system centers on life expectancy and decreases population size.

The causal-loop diagram does not disaggregate population by age. However, in the standard version of the model four cohorts are distinguished.\(^9\) Further disaggregation by other characteristics is missing.

Although the population sector is in general one of the least strongly criticized components of "World 3," Carter (1974: 203-204) also expressed concern over numerous aspects of that sector.\(^{10}\) Carter's criticisms include: the lack of sufficient differentiation of population; the reliance on only one parameter, life expectancy, for determining mortality; the lack of empirical studies to validate the fertility causal-loop system; and the lack of importance given the labor force in determining production output.

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\(^9\) In a more detailed version fifteen cohorts are utilized.

\(^{10}\) For a detailed critique of "World 3," see Cole et al., Thinking About the Future: A Critique of the Limits to Growth (1973).
Demographic-Economic Models in Review

The preceding review of macro demographic-economic models presents a perspective on the nexes of inter-relationships among demographic and socioeconomic variable often overlooked by "theories" of demographic transition. Whereas proponents of transition are mainly concerned with the effects of social and economic developments on population growth and change, an important aspect of economic growth and development models is the focus on the impact of population changes on economic components.

Robinson (1975: 17) articulates the findings of the various macro-economic-demographic models as follows:

Whatever development problems a country has, rapid population growth complicates them. It tends to retard the accumulation of savings and investment, to lower per capita living standards, and to lead government to spend on nondevelopmental welfare programs. The possibly positive link between population growth and development in Western European history seems to have very little relevancy for the developing countries. For them, except in highly special and unlikely circumstances, population growth is a barrier to development.

Reviewing the important trends in the construction of such models, numerous important changes have been noted. The production functions utilized in the models have become increasingly sophisticated. Nearly all recent modeling efforts have included variation of the

\[11\] These circumstances include cases where: "(1) marginal productivity exceeds average productivity per worker and both are rising; (2) the total supply of savings from any given total income is unrelated to the size of the population; and (3) the allocation of total savings is not affected by the age composition of the population" (Robinson, 1975: 17).
Cobb-Douglas type functions. Population has moved from its place as being considered solely as an exogenous parameter, to being treated as an endogenous variable. Some researchers have been investigating the alternative investment costs of population programs, given development oriented valued outcomes. The more comprehensive treatment given population related elements in interactive world models, such as BACHUE and "Limits to Growth," has given such simulations added appeal and improved face validity. In addition, however, attempts to incorporate such elaborate population feedback mechanisms have called increased attention to the need for further empirical research and data creation.

At this stage in the development of the models it appears to be somewhat premature and presumptuous to claim that the demographic, social and economic interrelationships contained therein accurately represent reality. At best the models serve as very general simulations of what some Western educated social scientists believe the relationships to be. In short, the demographic-economic models serve as simulations of the Western image (Image I) of the relationships among demographic, social and economic variables. This theme will be treated in more detail in Chapter VIII below.

The chapter immediately below provides a closer examination of the interrelationships discussed in this and the preceding chapter. Particular attention will be focused on the empirical findings regarding various of the relationships posited to exist. Also, in the
next chapter the interrelationships linking various aspects of the
demographic determinants of fertility and the effects of population
growth and change on social and economic factors will be examined.
CHAPTER VII
DEMOGRAPHIC-ECONOMIC INTERRELATIONSHIPS:
BRINGING TOGETHER THE PIECES

Introduction

In the preceding two chapters selected studies examining various interrelationships among demographic, social and economic variables were reviewed. In this chapter an attempt is made to fit together the findings of that research to provide a more coherent picture of demographic and economic interrelationships as seen through the eyes of Western educated social scientists. After a brief discussion of the empirical evidence (or lack thereof) regarding such relationships, the difficulties involved in providing such evidence are discussed. Data constraints are examined with reference to various strategies for analysis. Several of the relationships are then examined in further detail with the objective of shedding additional light on the nature of those interrelationships. Finally, an alternative methodology for integrating the various hypothesized relationships is presented and discussed.

A Review of Demographic, Social, and Economic Interrelationships

The findings of the studies which focused on the social and economic determinants of population growth and change can be clustered into three general categories with reference to the main independent variable(s) considered: income, mortality, and education. Each of these general groupings is briefly reviewed below.
Research into income-fertility relationships has resulted in differing conclusions. Adelman (1963), Heer (1966), and Weintraub (1962) found positive relationships between per capita income and measures of fertility. However, studies by Adelman and Morris (1966), Friedlander and Silver (1970), and Kirk and Srileantan (1969) arrived at inconclusive and/or conflicting results. There appears to be substantially more agreement regarding the relationship between income distribution and crude birth rate, however.

Recent studies, which have examined the relationship between measures of income inequality and fertility (Kocher, 1973; Repetto, 1974; Rich, 1973; Singer, 1974; and World Bank, 1974), have concluded that consistent and strong relationships exist. The conclusions of these studies have been stated in different ways. The findings reported by Repetto (1974), Rich (1973) and the World Bank (1974) support the proposition that fertility reduction is more sensitive to changes in income at the lower end of the income distribution than to changes in per capita income in general. Kocher (1973) and Singer (1974) argue that fertility has not been reduced where substantial income inequality exists.

The term fertility is employed liberally throughout this study. Strictly speaking, general fertility rate represents the average number of live births per 1,000 women in a population in a given year. However, the findings of an empirical study by Bogue and Palmore (1964) support a more flexible use of the term. In a cross-sectional study of 50 countries, the lowest correlation reported among crude birth rate, general fertility rate, and total fertility rate was \( r = .98 \). Thus, even though various research efforts discussed in this study employed differing measures for fertility, little meaning appears to have been lost by such general treatment. For a review of numerous such measures of "fertility" the reader is invited to consult a recent Smithsonian Institution Interdisciplinary Communications Program Staff Report, The Policy Relevance of Recent Social Research on Fertility (1974: 1-2).
The findings with regard to the relationship between income distribution and fertility, while not trivial, should be viewed with caution. These results are based on cross-national data analysis. As with the results of cross-national analyses of other relationships discussed below, serious problems regarding data comparability and compatibility exist.²

A second relationship which received wide treatment in the literature was the impact of mortality on fertility. Although general mortality rates were not ignored, much of the discussion centered on the effects of infant and child mortality on fertility. The importance of infant (child) mortality was often articulated as revolving around the psychological effect on parents of child-survival (see Cassen, 1974; and Taeuber, 1971). Infant and child mortality, it was often argued, affected parents' desired ideal family size.

Numerous researchers have argued that infant mortality is a necessary but not sufficient condition for fertility decline. These authors include Berelson et al. (1966), Cassen (1975), David (1967), Guzevatiy (1974) and Khalil (1973). Frederiksen (1966), however, argues that a substantial decrease in infant mortality might by itself

²Several of these problems will be discussed in more detail later in this chapter.
be sufficient to reduce fertility. Schultz (1971) and Immerwahr (1967) suggest that perhaps a threshold exists below which infant/child mortality must fall before reductions in fertility will set in.

Summarizing the overall research findings with respect to the relationship between infant/child mortality and fertility, the results are strongly positive. Such a strong association has been substantiated by the individual case studies by Harman (1970), Hassan (1966, 1967), Nerlove and Schultz (1970), Schultz (1969a, 1970, 1973), and Schultz and DaVanzo (1970). Several studies (DaVanzo, 1972; Janowitz, 1971; Nerlove and Schultz, 1970; and Schultz, 1969a), which have examined the relationship between general mortality and fertility, have reported similar results—both in size and magnitude—to the results reported for infant/child mortality. In general, the results of the studies examining the impact of various mortality measures on fertility represent the strongest and most consistent relationships discussed in Chapter V.

Other than mortality (especially infant/child mortality), the next most consistent and strongest relationships reported were between education and birth rates. Cross-national regression analyses conducted by Adelman (1963), Heer and Turner (1965), Heer (1966), Friedlander and Silver (1963), Janowitz (1971), and Ekanen (1972) support this point. In addition, numerous longitudinal individual case studies (Heer and Turner, 1965; Drakatos, 1969; Schultz, 1969a, 1969b, 1970, 1973; Intaka et al, 1971; Gendell et al, 1970; and Repetto, 1972) found similar results. When female educational
attainment or female literacy has been incorporated into the analyses (Schultz, 1969b; Ben-Porath, 1970; and Repetto, 1974) significant, strongly negative relationships emerge.

From these three main clusterings of independent variables— income, mortality, and education—various interesting and fairly well documented sets of relationships emerge. When considering social and economic determinants of fertility, at least three (and perhaps as many as six) variables need to be considered. These include income distribution (or alternatively per capita income), infant/child mortality (general mortality), and female educational attainment (total educational attainment). Given the arguments discussed above in support of Image I, these relationships represent only one side of the dynamic interplay among demographic, social, and economic factors. Consideration shall now be given to the impact of population growth and change on social and economic factors.

From the review of the demographic-economic modelling efforts presented in Chapter VI, various effects that population growth is hypothesized to have on social and economic phenomena can be identified. While the degree of specificity concerning the nature of the relationships is relatively high compared to the numerous relationships discussed above, the extent of empirical evidence supporting these relationships is sorely lacking. As in most other social science endeavors, many of the relationships which are theoretically the most interesting are extremely difficult to measure empirically.
Among the builders of demographic-economic models a consensus regarding the use of aggregate production functions has emerged. Most of the more recent models have employed Cobb-Douglas type production functions, including some mix of capital, labor, natural resources and technology as factors of production. Population influences total output in two ways: through the consumption function and through labor. Consumption is a function of population. That part of income which is not consumed is assumed to be savings. Savings is set equal to investment and thus serves as an increment to capital, a basic factor of production. The second way in which population influences total output is through labor. Labor supply, which serves as another basic factor of production, is affected by changes in the size and age distribution of the population.

Most of the modelling efforts also take into consideration various additional social and economic effects of changes in population size and age structure. As population size increases, demands on natural resources, food, government services and the ecological environment are said to increase. Rapid population growth rates affect child dependency, which in turn affects protein and calorie need levels, earning-expenditure ratios, and relative demands for governmental services.

In many of the models, population has been treated basically as an accounting mechanism for computing other variables such as per capita income. This manner of treatment appears to prevail even in many of the models where population is treated endogenously. As a
result, the population sectors of these models have generally been based on very simplistic assumptions. Many of the relationships regarding the social and economic determinants of fertility have been largely excluded.

The discussion in the following subsection will explore the nature of these relationships in somewhat more detail. What are the limitations of traditional correlational techniques for analyzing such relationships. If additional parameters are to be built into the models, what form might the relationships take?

The Use of Correlational Models

The research techniques employed in most of the studies reviewed in Chapter V were based on correlational models. This fact is not surprising, given the state of affairs of contemporary social science research. By far the most commonly employed methods of quantitative empirical political analyses are based on correlational models. This methodology in general attempts to account for the amount of variance in one variable (a dependent variable) during a specified time interval by the amount of change in another variable (an independent variable) during the same or some preceding time period of equal duration. The general object of such analyses of variance is often simply to explain the largest amount of variation in the dependent variable with the fewest number of independent variables.

In studies, employing such techniques, several underlying assumptions are often overlooked or given inadequate treatment. One such
assumption is that of linearity of the relationships. Thus, a unit change in the independent variable is assumed to predict toward a unit change in the dependent variable. Indeed, in analyses of most complex systems, such as a social system, such linear relationships are thought to be highly suspect. Of course, non-linear functions can be specified; but such specification requires a sound understanding of the processes operating in the system.

Brunner and Liepelt (1970) argue that social scientists usually ignore a major assumptions of correlational models—the analyst must first understand the process of the system that she/he is attempting to model before she/he can properly use correlation and/or regression techniques as tools in the study of dynamic feedback systems. Brunner and Liepelt (1970: 547) argue that,

. . .the imposition of misspecified regression equations -- those that do not reflect the underlying processes which produced the data -- on variables not in equilibrium leads to unstable statistical results of descriptive and heuristic utility only.

It is important then that an analyst possesses a general understanding of the basic processes operating in the system being modelled. In a great many of the studies reviewed, it is by no means clear that the analysts possess such a general understanding.

Another basic assumption of correlational techniques is independence. The variables being employed in the analysis to predict toward the dependent variable are assumed to be statistically unrelated to one another. There is substantial reason to question whether or not the various predictor variables employed in most of the studies were
statistically unrelated to one another. This point was discussed in Chapter V with specific reference to the Beaver (1975) study.

As was alluded to above, for purposes of incorporating more purely "theoretical" (less empirically based) relationships correlational techniques are somewhat troublesome. The same is true when it comes to examining the long term implications of various policy alternatives. These research objectives often conflict with the correlational model's emphasis on strong correlation coefficients. The desire to include policy relevant manipulable variables ("actionables") becomes an additional concern. The research goal of incorporating actionables in the study also conflicts with the emphasis on strong correlation coefficients. Among other reasons, this lack of strong association is partially the result of the slow impact of manipulable variables and their lack of dramatic consequences when the impact does occur.

An additional problem, reverse causation, is particularly troublesome in regression analyses of complex social systems. A basic assumption of regression models is that the relationship being analyzed is recursive in nature. The relationship between the independent and dependent variables is assumed not to involve simultaneous feedback. Especially with regard to certain interrelationships, such as income and fertility, such an assumption (at minimum) needs further consideration. As was stated above, technique based on correlational models requires that the user possess a fairly complete understanding of the process of the system being analyzed. Thus, until the nature of system processes regarding the interrelationship between income and fertility
is better understood, one should be cautious in interpreting findings of regression analyses of such interrelationships.

These and other data problems encountered when utilizing correlational models will be discussed below with reference to further analyses regarding social and economic determinants of fertility.

In order to further examine various relationships summarized in the first subsection of this chapter, a cross-sectional data set containing information for 97 less economically advanced countries was constructed. These countries represent all such societies for which data was available for most of the variables examined. The 97

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Two important caveats should be noted here. First "country" is the unit of aggregation being employed. Such usage, while laden with numerous difficulties, is unavoidable for the present research endeavor. The small amount of cross-sectioned data that is available is almost always aggregated at the "country" level. In very few cases is more detailed information to be found. The implications of this circumstance for research are compounded when the researcher is focusing on less economically advanced societies. In most cases the governments of these societies do not possess the organizational capacity to collect such information on their populations. Thus, estimation procedures of varying sophistication are employed to provide what data there is available.

A very large portion of the data employed in the empirical analysis sections of this study is of questionable reliability. Most of the data has been taken from United Nations publications. These publications are identified in the variable descriptions presented in this chapter. The reader is encouraged to refer to those publications regarding such reliability questions.

The second caveat regards the definition of "less economically advanced" societies. In this study, the distinction commonly employed by the United Nations will be utilized. The less economically advanced societies comprise: the Americas, excluding the United States and Canada; Africa, excluding South Africa; and Asia, excluding Israel and Japan.
countries were regionalized into five groupings, corresponding to the regional groupings employed in the regionalized "World Interactive Model." These areas include: Latin America (LAM), North Africa and the Middle East (MDE), Main Africa (AFR), South and Southeast Asia (SEA), and China (CHINA).

Six main variables were included in this data set. These variables, each identified in detail below, include: crude birth rate (CBR), per capita income (YPC), income distribution (YDIST), crude death rate (CDR), infant mortality rate (IMR), and per capita educational expenses for women (EDWPC).

Crude birth rate is defined as the number of live births per year per 1000 population occurring at mid-year. Data for this variable was coded for 1970 and were taken from the 1974 United Nations Demographic Yearbook.

Crude death rate was defined as the frequency of deaths in the whole population of a society, expressed as the number of deaths per year per 1000 population occurring at mid-year. Infant mortality rate was defined as the frequency of deaths occurring to newly born infants (at the time of birth) in the whole population of a society, expressed as the number of such deaths per year per 1000 population occurring during the first year of life.

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4 This model is being constructed under the direction of Mihajlo Mesarovic and Eduard Pestel. For a brief description of the model, see Mesarovic and Pestel (1974).

5 These regional groupings are differentiated according to the "World Interactive Model" classification scheme, in Appendix A.
at mid-year. Data for these two variables were taken from the 1974 United Nations Demographic Yearbook.⁶

Data for CDR and IMR were not coded for 1970, however, as was CBR. The empirical studies from which the relationships to be examined were drawn all agree that some time lag occurs between reductions in deaths and subsequent reductions in births. However, no consensus concerning such a lag emerged from a review of the studies. In the present project crude death rates were coded for 1967 and infant mortality rates for 1965 or the next closest year for which data was reported. The rationale behind employing these lags was based solely on theoretical considerations. Arguments supporting and/or refuting these and other various time lags are discussed in Chapter V.

Income per capita data were taken from the 1974 United Nations Statistical Yearbook. Data for this variable were coded for 1963, or closest available year.

The income distribution variable represented an attempt to weight per capita income with reference to income distribution. In constructing this index, the Gini Coefficient was employed as a measure of

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⁶The reliability of each of the variables taken from the United Nations Demographic Yearbook is questionable. This same statement is applicable to most social statistics for less economically advanced societies available on a cross-sectional basis from the United Nations or any other source. United Nations' (UN) sources have been employed throughout this study for data collection purposes. While the reliability of UN sources is questionable, UN data represent the most comprehensive and comparable information available for such societies. For discussions of data collection and reporting procedures the reader is referred to the discussions presented in the appropriate United Nations' sources.
income distribution. The Gini coefficient is a common statistical measure of income concentration.\footnote{For a concise discussion of the Gini coefficient and its close relative, the Lorenz curve, the reader is encouraged to see Sirageldin, 1975: 178-180.} This coefficient has been demonstrated to be highly associated with at least one other measure of income dispersion. Repetto (1974: 143) found the Gini coefficient to be closely associated ($r = 0.95$) with the share of total income received by the lowest 40 percent of the population in a sample of 64 countries. The Gini coefficients employed in the calculation of this variable are the same as those used by Repetto (1974) and Jain and Tiemann (1973).

To construct the index called YDIST, the average Gini coefficient was computed for those more economically advanced societies for which data was available.\footnote{These societies include all countries listed under regions 1-5 in Appendix A for which data was available.} The average developed country coefficient thus derived was $G = 0.34$. This statistic was then divided by the Gini coefficient of each less economically advanced country to yield an income multiplier. The properties of this new statistic were such that when multiplied by per capita income this latter figure would be inflated for those less economically advanced societies in which income was more equally distributed than in the more economically advanced societies' average. Conversely, YPC would be deflated for those societies' studied in which income was less equally distributed (Gini greater than 0.34) than in the more developed societies.
Although the Gini coefficient possesses the property of varying between zero (perfect equality) and one (perfect inequality), the actual variation is by no means as drastic. Of the forty-four less economically advanced countries for which Gini was available, the lowest and highest Gini coefficients were .26 (Republic of Korea and Libya) and .65 (Gabon). Thus, the resulting range for the income distribution multiplier was 1.3 to .52.

Per capita educational expenses for women (EDWPC) was a variable constructed to investigate the hypothesized relationship between female educational attainment and birth rates. This relationship is one which has received very strong support from previous empirical analyses. These studies are discussed in Chapter V.

Female literacy is the variable most often employed in these studies. However, for the purposes of the present study female literacy was not found to be an appropriate variable. The major reason that led to the exclusion of female literacy from the data set was that female literacy data is not only of very questionable reliability, but also is available for greatly differing points in time for different countries. Thus, to employ such a variable was thought to be unwise.

At least on theoretical grounds, a suitable measure of female education was found. This variable was per capita educational expenditures for women. To construct this variable some data transformation was required. From data on total public current educational expenditures and the percentage of such expenditures per level of
education (pre and first level, second level, third level and other), the amount of expenditures on pre-first, first, and second levels of education was coded. The resulting figures were multiplied by the percentage of women enrolled at these levels. Then, conversion was made to U. S. dollar equivalents; and finally per capita figures were computed. These data were coded for 1965. Educational expenditure (public current) statistics were taken from the 1968 United Nations Educational, Scientific, and Cultural Organization Yearbook. Midpoint exchange rates, employed for converting per capita income figure to United States dollar equivalents, were taken from various volumes of the United Nations Statistical Yearbook. Total population data for computing per capita figures were taken from the 1968 United Nations Demographic Yearbook.

These six variables were employed to further investigate certain interrelationships among demographic, social and economic variables selected from the three clusters of relationships specified above. The discussion which follows focuses on various data and analysis problems confronting researchers attempting to undertake such investigations.

9When data for the base year was unavailable, data for the closest year for which information was available was coded, following two decision rules. First, data which deviated more than two years from the base year was omitted. Secondly, data for more recent years received the highest coding priority.
In the studies reviewed above the only consistently strong (negative) relationship to emerge within the income cluster was between income inequality and crude birth rate. No consistent relationship emerged between per capita income and birth rates across the various studies. With reference to the effects of income inequality on fertility several authors concluded that the impact of changes in income on fertility was greater at the lower end of the income distribution than for changes in per capita income in general. This conclusion implies that the relationship between income and fertility is not linear. The argument put forth by Kirk (1971) that regional specific income thresholds exist below which significant declines in fertility do not occur also is not consistent with the assumption of linearity. Thus, if these relationships hold, the use of correlational techniques to measure the degree of association between these two variables could be quite misleading.

The type of relationship hypothesized between income inequality and fertility cannot be adequately tested employing cross-national data analysis. The relationship is posited to exist within societies. Any results of a cross-national analysis concerning the relationship must be viewed with caution. That is not to say, however, that nothing of value can be gained from such a cross-national study, especially if conducted on a regional basis. Scattergrams (scatter-plots) were employed to examine the structure of the simple associations between per capita income and crude birth rate and income distribution and crude birth rate. Figure 21 represents a scattergram
FIGURE 21

SCATTERGRAM OF CBR WITH YPC
of birth rates with per capita income for all developing regions taken as a whole.

The associational pattern represented in the scattergram is quite interesting. A fairly clear linear relationship appears to be present, especially as income levels exceed $250. The zero order correlation between the two variables is \( r = -0.76 \) (\( r^2 = 0.58 \)).\(^{10}\) The slope of the regression line is \(-0.03\). Thus, for each unit increase in YPC a .03 unit decrease in CBR is expected. The relationship depicted in the scattergram, while not proving the presence of a direct linear relationship between the two variables, is consistent with assumptions of linearity. The relationship illustrated is much stronger from that anticipated, given the findings of previous analyses.

Examining the results of regionalized scattergrams the general relationship appears to hold.\(^{11}\) Although the magnitude of the correlation coefficient fluctuated (from \( r = -0.56 \) for MDE to \( r = -0.89 \) for SEA), the slope was consistently around \(-0.03 \) (\(-0.02 \) for AFR). A consistent linear relationship thus seems to be present.

Figure 22 represents the scattergram between CBR and YDIST. Again, a fairly consistent negative linear relationship appears to be present. The zero order correlation between the variables was

\(^{10}\) As an arbitrary rule of thumb a simple correlation of .7 and a partial correlation of .4 will be considered as acceptable.

\(^{11}\) The region China was excluded from this and other analyses because of the small number of cases (n=5) involved.
FIGURE 22

SCATTERGRAM OF CBR WITH YDIST
$r = -0.80$. The slope was again $-0.03$. The limited number of cases ($n=41$) for which Gini coefficients were available and thus for which YDIST could be computed made regionalization appear to be of limited value. Nearly half ($n=17$) of the cases for which YDIST could be computed were from Latin America. For that region a strong negative correlation emerged ($r= -0.83$). The slope of the regression line was $-0.03$.

The pattern of the relationships illustrated in the above figures (both for YPC and YDIST) is not inconsistent with the conclusion drawn from other studies regarding the effects of income distribution on fertility. At lower levels of YPC, especially under $\$250$ (approximately), no clear relationship seems to emerge. However, above that income level a clear linear relationship exists. YDIST, which takes income equality into account, displays a fairly consistent relationship throughout the scattergram. Too much emphasis should not be placed on these crude findings, however. It is possible that outside (intervening) factors could be conditioning the relationships which were obtained. In addition, in order for the findings of such a cross-national examination to be instructive, two somewhat questionable assumptions must be accepted. It must be assumed that the nature of the income distribution for all developing countries taken as a whole or for individual regions does not differ in any important sense from the income distributions of the various societies which comprise these entities and that the relationship between income inequality and fertility does not vary from society to society. Given the cultural,
social and religious diversity across societies within geographically
defined regions, these assumptions do not appear to be realistic.

The scattergrams representing the relationships among the other
independent variables and CBR were much more difficult to interpret,
however. These scattergrams appear in Figures 23-25. Even though the
data points on these scattergrams do not appear to be randomly
located, no clear, describable relationships appear to be present.
One thing is clear, however, with respect to the mortality variables
(CDR and IMR). The assumption that the variables are linearly related
is quite uncertain. Thus, the results of studies employing correla-
tional models based on such an assumption could be very misleading.

The zero order correlation coefficients representing the inter-
relationships among the various variables appear in Tables 26–30.
These tables represent the correlation matrices for all regions combined
and for each individual region. The data appearing in these matrices
has been reorganized with regard to the relationships expected for
each variable cluster above. Table 31 presents these correlations
along with partial correlation coefficients which result when the
relationships between CDR and CBR, IMR and CBR, and EDWPC and CBR are
controlled for YPC. Such partial correlation coefficients must be
viewed with great caution, however. As was stated above, it is not
clear that the relationships between these independent variables and
CBR are linear. The only rationale for including such findings in the
above table was to bring into question another assumption -- indepen-
dence. From the intercorrelation matrices and the partial correlation
FIGURE 24

SCATTERGRAM OF CBR WITH IMR
FIGURE 25
SCATTERGRAM OF CBR WITH EDWPC
<table>
<thead>
<tr>
<th></th>
<th>CBR</th>
<th>CDR</th>
<th>IMR</th>
<th>YPC</th>
<th>YPCGI</th>
<th>EDWPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(95)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDR</td>
<td>.62</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(95)</td>
<td>(96)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMR</td>
<td>.33</td>
<td>.63</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(67)</td>
<td>(67)</td>
<td>(67)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YPC</td>
<td>-.76</td>
<td>.65</td>
<td>-.31</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(71)</td>
<td>(71)</td>
<td>(67)</td>
<td>(71)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>YPCGI</td>
<td>-.78</td>
<td>-.58</td>
<td>-.40</td>
<td>.95</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(48)</td>
<td>(48)</td>
<td>(48)</td>
<td>(48)</td>
<td>(48)</td>
<td></td>
</tr>
<tr>
<td>EDWPC</td>
<td>-.51</td>
<td>-.54</td>
<td>-.37</td>
<td>.51</td>
<td>.38</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(67)</td>
<td>(67)</td>
<td>(67)</td>
<td>(67)</td>
<td>(48)</td>
<td>(67)</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses represent the number of cases on which correlations were calculated.
TABLE 27
ZERO ORDER CORRELATION MATRIX
AMONG MAIN VARIABLES FOR LATIN AMERICAN REGION (LAM)

<table>
<thead>
<tr>
<th></th>
<th>OBR</th>
<th>CDR</th>
<th>IMR</th>
<th>YPC</th>
<th>YPCGI</th>
<th>EDWPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(25)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDR</td>
<td>.56</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(25)</td>
<td>(25)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMR</td>
<td>.18</td>
<td>.20</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(24)</td>
<td>(24)</td>
<td>(24)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YPC</td>
<td>-.79</td>
<td>-.61</td>
<td>-.37</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(22)</td>
<td>(22)</td>
<td>(22)</td>
<td>(22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>YPCGI</td>
<td>-.72</td>
<td>-.54</td>
<td>-.49</td>
<td>.93</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(18)</td>
<td>(18)</td>
<td>(18)</td>
<td>(18)</td>
<td>(18)</td>
<td></td>
</tr>
<tr>
<td>EDWPC</td>
<td>-.38</td>
<td>-.52</td>
<td>-.19</td>
<td>.22</td>
<td>.12</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(18)</td>
<td>(18)</td>
<td>(18)</td>
<td>(18)</td>
<td>(18)</td>
<td>(18)</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses represent the number of cases on which correlations were calculated.
### TABLE 28

**ZERO ORDER CORRELATION MATRIX AMONG MAIN VARIABLES FOR MIDDLE EAST AND NORTH AMERICAN REGION (MDE)**

<table>
<thead>
<tr>
<th></th>
<th>CBR</th>
<th>CDR</th>
<th>IMR</th>
<th>YPC</th>
<th>YPCGI</th>
<th>EDWPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDR</td>
<td>.63</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMR</td>
<td>-.09</td>
<td>.35</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YPC</td>
<td>-.64</td>
<td>-.84</td>
<td>-.37</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>YPCGI</td>
<td>-.94</td>
<td>-.94</td>
<td>-.25</td>
<td>.98</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>EDWPC</td>
<td>-.27</td>
<td>-.13</td>
<td>-.43</td>
<td>.65</td>
<td>.58</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses represent the number of cases on which correlations were calculated.
TABLE 29

ZERO ORDER CORRELATION MATRIX
AMONG MAIN VARIABLES FOR AFRICAN REGION (AFR)

<table>
<thead>
<tr>
<th></th>
<th>CBR</th>
<th>CDR</th>
<th>IMR</th>
<th>YPC</th>
<th>YPCGI</th>
<th>EDWPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR</td>
<td>1.00</td>
<td>(39)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDR</td>
<td>0.37</td>
<td>1.00</td>
<td>(39)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMR</td>
<td>0.05</td>
<td>0.65</td>
<td>1.00</td>
<td>(20)</td>
<td>(20)</td>
<td>(20)</td>
</tr>
<tr>
<td>YPC</td>
<td>-0.71</td>
<td>-0.32</td>
<td>0.13</td>
<td>1.00</td>
<td>(23)</td>
<td>(23)</td>
</tr>
<tr>
<td>YPCGI</td>
<td>-0.70</td>
<td>0.11</td>
<td>0.20</td>
<td>0.94</td>
<td>1.00</td>
<td>(15)</td>
</tr>
<tr>
<td>EDWPC</td>
<td>-0.11</td>
<td>-0.34</td>
<td>-0.62</td>
<td>0.40</td>
<td>0.31</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses represent the number of cases on which correlations were calculated.
### TABLE 30

ZERO ORDER CORRELATION MATRIX AMONG MAIN VARIABLES FOR SOUTH AND SOUTH EAST ASIAN REGION (SEA)

<table>
<thead>
<tr>
<th></th>
<th>CBR</th>
<th>CDR</th>
<th>IMR</th>
<th>YPC</th>
<th>YPCGI</th>
<th>EDWPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(14)</td>
<td></td>
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<tr>
<td>CDR</td>
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<td></td>
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<tr>
<td></td>
<td>(14)</td>
<td>(15)</td>
<td></td>
<td></td>
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<tr>
<td>IMR</td>
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<tr>
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<td>(12)</td>
<td>(12)</td>
<td>(12)</td>
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<tr>
<td>YPC</td>
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<td></td>
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<tr>
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<td>(12)</td>
<td>(12)</td>
<td>(12)</td>
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<tr>
<td>YPCGI</td>
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<td>(8)</td>
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<td>EDWPC</td>
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<td>.88</td>
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<td>(10)</td>
<td>(10)</td>
<td>(10)</td>
<td>(10)</td>
<td>(8)</td>
<td>(10)</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses represent the number of cases on which correlations were calculated.
### TABLE 31

**SIMPLE AND PARTIAL CORRELATION COEFFICIENTS OF SELECTED VARIABLES**

<table>
<thead>
<tr>
<th>Variable Cluster</th>
<th>Correlational Variables</th>
<th>Control Variable</th>
<th>All Regions</th>
<th>LAM</th>
<th>MDE</th>
<th>AFR</th>
<th>SEA</th>
<th>China</th>
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<tbody>
<tr>
<td>Mortality</td>
<td>CBR x CDR</td>
<td></td>
<td>.62 (95)</td>
<td>.56 (25)</td>
<td>.63 (12)</td>
<td>.37 (39)</td>
<td>.68 (14)</td>
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<tr>
<td></td>
<td>CBR x IMR</td>
<td></td>
<td>.33 (67)</td>
<td>.18 (24)</td>
<td>-.09 (10)</td>
<td>.05 (20)</td>
<td>.63 (12)</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>CBR x CDR</td>
<td>YPC</td>
<td>.18 (70)</td>
<td>.04 (22)</td>
<td>.21 (12)</td>
<td>-.01 (23)</td>
<td>-.03 (11)</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>CBR x IMR</td>
<td>YPC</td>
<td>-.01 (55)</td>
<td>-.44 (21)</td>
<td>-.18 (10)</td>
<td>-.06 (14)</td>
<td>.27 (9)</td>
<td>*</td>
</tr>
<tr>
<td>Income</td>
<td>CBR x YPC (63)</td>
<td></td>
<td>-.76 (71)</td>
<td>-.79 (22)</td>
<td>-.64 (12)</td>
<td>-.71 (23)</td>
<td>-.87 (12)</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>CBR x YDIST (63)</td>
<td></td>
<td>-.78 (48)</td>
<td>-.72 (18)</td>
<td>-.94 (6)</td>
<td>-.70 (15)</td>
<td>-.52 (8)</td>
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</tr>
<tr>
<td>Education</td>
<td>CBR x EDWPC</td>
<td></td>
<td>-.51 (67)</td>
<td>-.38 (18)</td>
<td>-.27 (9)</td>
<td>-.11 (28)</td>
<td>-.79 (10)</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>CBR x EDWPC</td>
<td>YPC</td>
<td>-.11 (54)</td>
<td>-.26 (17)</td>
<td>-.32 (9)</td>
<td>.08 (18)</td>
<td>.47 (8)</td>
<td>*</td>
</tr>
</tbody>
</table>

**Notes:** Figures in parentheses represent the number of cases included in each correlation.

*Indicates that an insufficient number of cases existed to calculate meaningful coefficients.
coefficients it appears as though the various "independent" variables are not independent of one another.

Thus, numerous data problems have arisen with regard to the use of correlational models. It is by no means clear that numerous of the assumptions required by such models are met. However, at the same time the interrelationships drawn from the numerous empirical studies do seem to be those consistently articulated in the literature and in international forums as being important by the proponents of Image I identified in Chapter IV above. Thus, an alternative approach is needed with which to examine such relationships.

**An Alternative Approach**

From the above discussion of the data problems involved with the use of correlational techniques, it becomes evident that alternative approaches are needed for exploring the implications of the interrelationships among various system components. The kinds of data and the nature of the assumptions required for proper utilization of techniques based on correlational models are simply not available for most third world societies and governments. When it comes to the selection of a methodological tool for incorporating less empirically based relationships and for examining the long term implications of various policy alternatives, a computer simulation approach serves as an alternative to correlational models.

One of the dominant models employed for simulating dynamic world systems has been System Dynamics. The term "System Dynamics" refers to the dynamic process modelling attempts via simulation which have
been conducted (primarily) by scholars associated with the "System Dynamics Group" at the Sloan School of Management at M.I.T. Choucri et al. (1972) have described system dynamics as follows: "System Dynamics is a theory of system structure and a set of tools for identifying, representing, and analyzing multi-loop, non-linear feedback relationships." Like any methodology which could be employed, the System Dynamics approach, employing DYNAMO computer language, is underlain by numerous assumptions. These assumptions include:

1) Complex system;
2) The examination of functional relationships in a feedback system, and not of stochastic relationships;
3) The basic structure in the system is the feedback loop;
4) Continuous time;
5) Correct identification of variables and relationships;
6) Accurate initial estimates of variable values; and
7) Manipulability.

The following discussion will examine these assumptions with reference to the nature of the problem being confronted.

As was discussed above, the system to be modelled is quite complex in nature. Such complexity includes the following attributes:

1) A large number of variables and relationships;
2) Relationships which might be non-linear in nature; and
3) Relationships are characterized by varying time delays (lags).
system dynamics is designed to handle the modelling of such complex systems.12

The second assumption states that System Dynamics is designed to explore functional relationships in a dynamic feedback system, as opposed to the analyses of stochastic relationships which is the case with most conventional social science methodologies.

The difference in emphasis is one of interlocking feedback with non-linear relations in a system of differential equations versus (1) best fit criteria, (2) simultaneous solution of algebraic equations, or (3) optimization of key parameters. (Choucri et al., 1972: 24).

The analyst employing system dynamics need not possess as complete an understanding of the system's processes as is required by correlational techniques. Indeed, such computer simulations are devices through which the analyst can gain a better understanding of the interrelationships of the various elements of the system as simulated. Such flexibility in the a priori specification of process, as provided by System Dynamics is important for modelling a system based on very incomplete information. However, when at least some information is available regarding the nature of the system's processes and when that information is specified in discrete time units, correlational techniques can prove quite useful. It is argued that such a situation exists regarding the present research endeavor.

12 The term System Dynamics (with capital letters) is used to refer specifically to those modelling efforts which employ DYNAMO computer language. However, at a more general level the term system dynamics (with small letters) is often used to refer to other simulation efforts which employ other programming languages (see Boughey, 1976).
The third assumption — the basic structure of the system is the feedback loop — is consistent with the nature of the system to be modelled. The positive and negative feedback linkages inherent in complex social systems have been identified in almost all of the System Dynamics simulation projects. Meadows et al., (1974); Hamilton et al., (1969); Forrester, (1971); and Boughey, (1976) all present detailed discussions of feedback systems involving demographic elements.

In the Hamilton et al. (1969) discussion of their effort to construct a System Dynamics simulation of the Susquehanna River Basin region, a detailed description of their population sector and the feedback relationships built therein is presented. What is striking about the Battelle (Hamilton et al.) sponsored study is that empirical data has been combined with a System Dynamics approach.

Assumption four states that time is to be treated as being continuous. Thus analysis is not based on data divided into discrete time units. This assumption is not in agreement with an important aspect of the present research endeavor. Data employed for parameter estimation is discrete in nature. In addition, various lagged relationships are thought to be present in the system. This is particularly crucial with regard to policy relevant ("actionable") variables.

The fifth assumption -- correct identification of variables and parameters -- is somewhat questionable in terms of the present research, as it is in almost all social science modelling efforts. Given the seeming urgency of the problem being confronted, a temporary
relaxation of this rigorous assumption appears warranted. Researchers, while constantly striving to refine estimates of variable and parameter values, should not be too harshly criticized for proceeding on the basis of the best available estimates.

The assumption of manipulability is also a key element of the overall research strategy of the present study. Given specified valued outcomes, what are the impacts of alternative policy options? The research approach selected must be able to provide a framework within which this question can be answered.

System Dynamics, as employed by the MIT Group, is tied directly to DYNAMO computer language. In addition to the problems identified in the discussion of the assumptions above, one other major factor mitigates against the use of this methodology in the present research effort. There appears to be substantial difficulty in adapting DYNAMO to computers available to decisionmakers in assistance granting organizations and in developing countries. Thus, future use of the findings of this study, represented in terms of more elaborately simulated demographic-socioeconomic interrelationships, if programmed in DYNAMO, might be severely restricted.

A modified system dynamic model, as constructed under the directorship of Mihajlo Mesarovic and Eduard Pestel, does provide a way to overcome some of the most crucial problems identified above with reference to DYNAMO assumptions. The Mesarovic and Pestel "World Interaction Model" and the various regional models developed in their project are not programmed in DYNAMO. The methodology underlying their models does not assume continuous functional relationships.
Thus, parameters, estimated from discrete data, can be more readily employed. Also, various lagged relationships can be examined in the context of the simulated system.

There remain, however, many similarities between the approach used by Mesarovic and Pestel and that employed by the MIT Group. For example, eight steps of a Systems Dynamic research design, identified by Meadows et al., (1974: 5), are equally helpful in constructing system dynamics models not based on DYNAMO. These eight steps are:

1) a general verbal description of the system to be modelled;
2) specifications of the model's purpose;
3) definition of the model's time horizon;
4) identification of major elements necessary to represent the relevant aspects of the system;
5) postulation of the model's structure (identification of cause-effect relationships and feedback loops);
6) estimation of the model's parameters and qualification of the causal assumptions;
7) evaluation of model's sensitivity and utility through the basic simulations run;
8) experimentation by means of policy simulation of alternative policies.

These eight steps appear to be quite useful in guiding any effort at modelling dynamic systems. These eight steps appear to possess a high degree of compatibility with Lasswell's five problemsolving tasks identified above. The system dynamic steps,
however, provide a somewhat more specific framework within which to organize research tasks. The following discussion illustrates the utility of this framework for confronting the particular research task at hand.

Several of the eight steps have already been addressed above. The first three chapters above have provided a general verbal description of the system within which the research problem is located. In addition, the model's purpose has been discussed in detail in the Introduction (Chapter I).

With reference to the specification of the horizon of the model, a 50 year period appears to be an acceptable choice. This length of time is that usually employed for policy simulation runs of the "World Interactive Model" and the various regional models. Fifty years seems sufficient to allow the interactions among the various (oftentimes lagged) elements of demographic-economic models. Even though there appear to be discrepancies in the literature regarding the exact specifications of time lags, sufficient time needs to be allocated to allow changes in the age structure to work through the model. Fifty years seems sufficient for that task to be accomplished.

At the same time, however, fifty years does not appear to be so long as to make the exercise totally unrealistic, given the possibility of unexpected, abrupt system change. An important point needs to be explicitly stated at this time. The development of a valid development planning model is NOT an objective of this study. Although every effort is being made to incorporate empirically derived parameters into the model, the lack of isomorphism or complete empirical correspondence
of the model is not and should not be considered as an "acid test" of the utility of the model. The purpose of the model is to demonstrate the implications of the interrelationships among the various elements of the system as modelled, based on a Western social science image of those interrelations.

Based on the literature on social and economic determinants of fertility and the impact of demographic change on social and economic factors, the major elements required to represent the relevant aspects of the system as described by Western social scientists were identified. Next, the causal relations and feedback loops believed to be important for adequately representing the system were specified. These relationships have been carefully examined and discussed above. The substantial data problems involved in the determination of empirically valid parameter estimates were reviewed in detail. The resulting conclusion was that it appears very risky at best to make any claim with regard to empirical validation. At best, the resulting computer models can be viewed as Western social scientists' images of the interrelationships among demographic, social and economic factors.

The following figure (Figure 26) illustrates a composite flow chart of demographic, social and economic interrelationships which appear to be similar to those relationships proposed by supporters of Image I. The relationships specified in the diagram represent a general synthesis of various findings, assumptions and hypotheses drawn from the literature reviewed above.
FIGURE 26

FLOW CHART OF GENERAL STRUCTURE OF IMAGE I RELATIONSHIPS*

Notes:  a. Class specific
       b. Sector specific: Agricultural and Non-agricultural sectors
       * Unless specified otherwise arrows indicate positive relationships.
In the flow diagram population is distributed by age and sex, according to income related classes. Population growth is assumed to be a function of births and deaths and previous distributions. Deaths are a function of consumption (mainly dietary deficiencies) and health services. Deaths would directly affect births, especially through infant and child mortality multipliers. Births are also a function of education and family planning expenditures (health services) as well as fertility distribution.

Production is divided into sectors. At a minimum two sectors, agriculture and non-agriculture) need to be specified. Aggregate production functions would be employed. Thus, production depends on inputs of capital, technology, natural resources, and labor. Population impacts on production in two main ways. First, labor is a function of population distribution and labor force participation rates. Secondly, total income is distributed among classes and then divided by class population. Per capita income with classes would thus be computed. The resulting class specific YPC, after taxes, would be divided among consumption and savings. Savings would be treated as an increment to capital. Consumption would go to satisfy population demands and needs. Deficiencies in dietary needs, if severe enough, could result in starvation deaths, thus feeding back into population.

\[13\text{In this simple representation migration (both within and across societies) has been excluded for the sake of simplicity.}\]
Taxes extracted from income would go to the government. There these revenues could be apportioned among various sectors. In the diagram two sectors are shown, services and developmental expenditures. These expenditures serve as inputs into the population sector through affecting death and birth (via educational expenditures). Governmental revenues could also be expended for increasing the capital investments factor of the production function.

The purpose of this flow chart is not to specify a valid model of the interrelationships contained therein. Instead, the diagram represents a general interpretation of the interrelationships being proposed by proponents of a particular image of the relationships. A caveat should be noted, however. Substantial differences exist among various of the scholars reviewed above with reference to the exact nature of many of the relationships in question. Relating Figure 26 to the empirical findings reviewed above underlines this point.

With regard to the effects of income on fertility a direct negative relationship is illustrated in the figure. However, the findings of the various empirical studies which examined this relationship are far from clear on this matter. With respect to the relationship between per capita income and fertility differing conclusions were cited. Only with respect to income distribution were strong relationships consistently reported. In the empirical analysis conducted in this study, strong relationships were found between fertility and both income related variables. Thus, until more convincing evidence
is discovered, the direct negative relationship posited in Figure 26 between disposable income and births appears to be within a broadly defined range of acceptability. The presence of such a relationship in the diagram is also compatible with the Western oriented image discussed above.

Although the relationships specified between deaths and births and education and births are strongly supported by the findings of previous empirical studies, the accuracy of such findings has been brought into question. On the basis of the simple empirical investigation undertaken herein the independent influence of these variables on fertility is questionable. When controlling for per capita income the correlations between crude death rate and crude birth rate and educational expenditures on women declined substantially to very low levels. In addition, it was discovered that the accuracy of the assumption that the variables are linearly related was quite uncertain. Thus, the results of the empirical studies into the relationships which employed correlational models should be treated with caution. It should be noted again, however, that such lack of consensus is not necessarily incompatible with further use of the figure. The representation being proposed in Figure 26 is only a synthesized "image," aggregating some of the more interesting demographic social and economic relationships.

In this chapter the findings from the scholarly literature reviewed in Chapters V and VI were further synthesized and critically examined. In terms of the larger research frame of reference, the completion of this task permits the researcher to better understand
the conditioning factors in the outer environments confronting organizational decision-makers. In the following chapter the discussion begins by exploring various implications of competing images and of empirical research findings for the projection of future demographic economic developments.
CHAPTER VIII
THE POLITICS OF POPULATION ASSISTANCE

Introduction
As a result of the above discussions the main research puzzle can now be more clearly confronted. How can social scientists assist individuals in authoritative positions in population assistance granting organizations to better understand the implications of their images for the attainment of organizational goals? The discussion in this chapter seeks to answer this question. In doing so the two remaining research objectives are undertaken. First, the implications of competing images and empirical research findings for the projection of future demographic-economic development are explored. Then various impacts of images for the attainment of organizational goals are discussed. Computer simulation is employed to investigate these objectives.

The role of computer simulations given such a problem-solving orientation was identified in Chapter I. Computer simulation runs provide: 2) projections of future developments without policy interventions; and 2) a means of assessing within the context of the model the relative contributions of various policy alternatives.

It is not an objective of this study to prescribe policy alternatives. Nor does the present study deal with deriving an empirically valid computer model of demographic-economic relations. The objective being pursued in this portion of the study is much more humble.
Given a computer model of Image I, what are the implications for the attainment of organizational goals of various alternative assistance activities.

For the present purposes a primary concern is working with a computer model that captures the essential characteristics of Image I. No one model is likely to include all of the relationships depicted in Figure 26. However, the "SAINT 2" interactive one-region model, constructed under the direction of Mihajlo Mesarovic at Case Western Reserve University, does include a great many of the relationships. This model will be discussed in detail below.

The "SAINT 2" Model

SAINT 2 is composed of four sub-models and the interconnections among them. These four sub-models are: population, economics, agriculture (food), and energy. In the following discussion these sub-models will be examined briefly, focusing on the interrelationships between elements of the population sub-model and the other three.

The population sub-model differentiates the total population into two classes: rural and urban. Within each class population is divided into 86 age categories. Figure 27 illustrates a flow diagram of the computer program which operates the strictly demographic portion of the sub-model.

1The following discussion of "SAINT 2" is based on informal model documentation provided to the author by Juan Huerta, Case Western Reserve University, Cleveland, Ohio.
FIGURE 27

SAINT 2: POPULATION SUBMODEL 1
At the beginning of a simulation run an age and class specific population table for the region is input into the model. Class population is computed by summing the populations of each age category. Total population for the first time period is computed by summing class populations. The model has been constructed to allow migration of population between classes. Emigration between classes is assumed to move in one direction only. Thus, a portion of the rural population can emigrate into the urban population. Only emigration outside the region can occur in the urban class.

Protein and calorie need is specified by age category and each class has specific nutritional needs. The class specific protein and calorie needs are computed by multiplying the age specific class population by the per capita protein and calorie needs of each age category.

Figure 28 represents the interface of the population submodel with the economic and agricultural submodels. This figure illustrates how the age specific population for each class for the beginning of the second time period is computed. After gross regional product is computed by summing the sectorial value addeds, per capita GNP for each class is computed. The resulting GNP per capita for each class is then input into a fertility income factor. This factor represents the impact of changes in income on fertility.

The nature of the fertility income factor is represented in Figure 29. The factor assumes that the speed with which a population moves toward equilibrium fertility is affected by changes in per
FIGURE 28

SAINT 2: POPULATION SUBMODEL 2
FIGURE 29

GRAPHIC ILLUSTRATION OF THE FERTILITY INCOME FACTOR

capita GNP. However, the relationship between income and fertility is not assumed to be strictly linear. The fertility distribution is not affected by changes in income until a threshold of $250 per capita is reached. At that point a multiplier is put into effect so that 40 percent of the movement from the initial fertility distribution to the equilibrium fertility distribution occurs before $1000 per capita is reached. The remainder of the effect is spread over the next $7000 per capita income gain.

The fertility income factor is employed as a component of a larger environmental factor affecting fertility. The other major components of this factor are literacy total and educated total by class. The percentages of class populations which are literate and educated are weighted (to give education twice the impact of literacy) and summed to form an educational factor. The educational factor and the income factor are assumed to be related. The nature of this relationship is treated as multiplicative. The resulting environmental factor is treated as a linear interpolation between historic fertility and equilibrium fertility which ranges between 0 and 1.

The environmental factor is treated as an input into the computation of births for the time period. The other components employed for determining births are population by class and age specific crude birth rate.

Total deaths are a function of deaths by age category and age specific deaths by starvation. Starvation deaths are a function of age specific calorie and protein needs and calories and proteins
available. Finally, additions of births to current population are computed. Total deaths are subtracted from the result and thus the age-specific population distribution for each class for the next time period is computed.

The structures of the remaining three submodels are illustrated in Figures 30-36. Only the aspects of these submodels which relate directly to the population submodel will be discussed.

In the economic submodel seven sectors have been identified. Sectorial value addeds can be computed by the model in three ways; the quotient capital to capital-output ratio; employing a Cobb-Douglas production function; or from the minimum of the capital to capital-output ratio and labor to labor-output ratio. Gross regional product can be computed in two ways. One way is simply to sum the sectorial value addeds. The other way, assuming an input-output matrix is provided, is to obtain the total production and then the sectorial final demands. The sectorial final demands are summed to yield gross regional product. Gross regional product is divided into government expenditure, private consumption, investment, imports and exports.

The agricultural (food) model contains three basic components: livestock, machinery and land. Investments in agriculture are split accordingly. Land is divided into three types: irrigated, non-irrigated and grazing. Land developed by type is allocated to crop types (grain, non-grain and industrial). Yields are computed and total calories and total proteins available in the region are finally derived. Food production by crop is subtracted from food needed by type to provide the food deficit for the region.
FIGURE 30
SAINT 2: ECONOMIC SUBMODEL 1
FIGURE 31
SAINT 2: ECONOMIC SUBMODEL 2
FIGURE 32

SAINT 2: FOOD SUBMODEL 1
FIGURE 33
SAINT 2: FOOD SUBMODEL 2
Population Food Need by Type

Coefficient to Distribute Production

Production By Crop

Crop Use by Category

Calories Available

Protein

Calorie Conversion Factor by Crop Type

Protein Available

Calorie Conversion Factor by Crop Type

Food Need by Type

Food Deficit

Price of Imported Food

Food Import Cost

Standard Consumption of Food by Type

FIGURE 34

SAINT 2: FOOD SUBMODEL 3
FIGURE 35
SAINT 2: ENERGY SUBMODEL 1
FIGURE 36
SAINT 2: ENERGY SUBMODEL 2
The energy submodel incorporates five different types of energy. These are: gas, oil, coal, hydro and nuclear. Reserves, resources and prices are initially specified for each. The main tasks performed in the submodel are to compute energy deficits or surpluses and determine the energy investments required, given energy demand.

With reference to the flow diagram of Image 1 presented in Figure 26 above, most of the interrelationships therein specified are found in "SAINT 2."

Although empirical validity is not assumed to be a critical element with regard to the use of the computer simulation, it is informative to examine areas of difference. The major discrepancies occur with reference to the relationship between mortality and fertility and the effects of governmental services on mortality and fertility.

In Figure 26 a direct relationship was posited between mortality and fertility. As was discussed in Chapter VII, such a relationship, especially between infant mortality and fertility, was strongly supported by the findings in the empirical literature reviewed. However, as was also demonstrated in that chapter, such findings should be viewed with caution. The research methodology employed in a vast majority of the studies assumed that the variables were linearly related. A closer examination of the relationship demonstrated that such an assumption was questionable in several cases. Also, in the data analysis undertaken in this research effort no clear independent
relationship emerged between mortality variables and crude birth rate when controls were instituted for per capita income. Thus, on empirical grounds the absence of such a direct relationship in the model is not necessarily troublesome, even though the inclusion of such a relationship would be analytically interesting. The exclusion from the model of direct relationships between governmental services and deaths and governmental services and births gives rise to far less concern. The effects of such relationships can be incorporated and observed via scenarios during simulation runs.

The effects of education and income on births are incorporated in the model via the environmental factor. As was described above, this factor contains two main components: a fertility income factor and a fertility education factor. The nature of the fertility income factor corresponds closely with the empirical findings discussed above. "... With increasing economic development birth control programs become more effective and desired family size decreases" (Strauch and Huerta, 1976: 11). A $250 per capita income threshold must be surpassed before such an effect becomes operative.

The fertility education factor is somewhat more troublesome, however. Again, a direct relationship between education (especially female education) and fertility was strongly supported in the studies examined. Similar to mortality, however, no clear independent relationship between these variables was uncovered in the data analysis conducted in this study. Even if a relationship does exist, there is some doubt that such a relationship is linear (an assumption made in most of the empirical studies reviewed).
The nature of the interrelationship between the income factor and the education factor, with reference to their joint effect on fertility, is far from certain. In the model the relationship is multiplicative. Equally convincing arguments could probably be made for numerous other forms of the relationship. Such discussion, however, is beyond the scope of the present study.

Even given the above reservations, the environmental fertility factor incorporated in the model does appear to correspond closely enough to the Western image. Viewed from another perspective, even if the model does not totally correspond with the composite image, "SAINT 2" can be considered an image of at least one group of Western social scientists.

Given the nature of "SAINT 2" a series of simulation runs were conducted, based on parameters estimated for Mexico. Mexico was not randomly selected. This country was selected primarily because of the relative completeness of the data available. The reliability of this data should not be at issue here for the country (or region) employed is relatively unimportant. The author simply desired to utilize a case for which a minimum of artificial parameter estimation would be required. Thus, it is imperative that it be understood that the results of the simulation runs do not say anything meaningful regarding the state of affairs or relative merits of policy alternatives in any particular national social setting.
Simulation Runs

In the above subsection the basic components of "SAINT 2" were presented. The discussion in this subsection will focus on the results of conducting various simulation runs employing this computer model. The simulation will first be employed to generate projections of future developments, assuming no intervention by the observer. Then, the relative contributions of various policy alternatives toward the attainment of generalized organizational goals will be explored. Given such organizational goals, what are the implications of various alternative courses of action toward meeting those goals?

Before undertaking such activities, however, various monitoring variables need to be identified. Such variables serve as indicators of movements toward or away from the attainment of organizational goals. Thus, relevant aspects of organization goals must be identified. For the purposes of conducting these simulation runs only very generalized aspects of organizational goals will be employed. A more complex treatment of such goals will be undertaken in the next section of this chapter.

All four of the organizations examined above have been major funding agents in the area of population/family planning programs. However, in each case the focus on population assistance is closely linked to social and economic conditions such as poverty and malnutrition. Thus, it is important that monitoring variables capture these concerns as well as demographic changes.
For the purposes of the present discussion particular organizational role constraints are assumed to be held constant across the organizations. The primary interest will be on general organizational goals growing out of shared valued outcomes. In relating these shared constraints to "SAINT 2" several monitoring variables can be identified. These include: total population (POPTOT), total population growth rate (POPRTO), class specific population (POP), class specific population growth (POPR), class specific crude birth rate (CBR), class specific crude death rate (CDR), class specific per capita income (YPC), unemployed manual labors (ULAB MANLAB), unemployed skilled works (ULAB SKILLD), Calorie deficit (CLDEF), protein deficit (PRDEF), rural to urban migration (RURPOP), and emigration (EMMPOP). This set of monitoring variables encompasses a broad range of developmental concerns: various demographic changes and conditions, economic conditions, and nutritional conditions.

Based on these monitoring variables, the implications of various alternative courses of action can be identified. For all of these monitoring variables, except YPC, the organizational goals tend toward reductions. Given Image I, population size and growth are perceived as being problems, along with poverty and malnutrition.

Given the structure of "SAINT 2" as described above, a standard simulation run was conducted. During this run no external manipulations were undertaken. Such a simulation entailed running the model employing only base value parameters. No attempt was made at this time to initiate policy changes through scenario analysis. The
results, presented in Tables 32 and 33, represent the projection of specific future demographic-economic developments based on the nature of the system as modelled. This standard run illustrates the unhindered interaction of the various model components through time. The results reported in the tables should be employed as a standard against which to compare later simulation results after various interventions.

Examining the results, it is apparent that the already high rate of population growth for the simulated society as a whole rises even higher during the 50 years covered. By 2025 total population reaches 279 million. Calorie deficits are present in every year of the simulation run and steadily grow to a level of 187 Tera Calories by 2025. Deficits in protein begin to appear in 2008 and grow rapidly to reach a level of .9 Tera Calorie by 2025. Both Calorie and protein deficiencies are below the starvation death threshold, however.

For the entire society 18.3 million manual laborers and 9.9 million skilled workers were unemployed. These figures represent 13 percent and seven percent of the adult population. Thus, combined unemployment represents 20 percent of the adult population.

\[\text{In reporting unemployment figures for the simulation runs below such percentages will be employed (ULAB (type)/adult population).}\]
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SAINT 2;

STANDARD SCENARIO RUN

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<th>Column of Class Indicators</th>
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<td></td>
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<td>Negative</td>
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**Table 33: Standard Scenario Run Class Indicators**
Population growth in the urban sector was tremendous, even though the population growth rate slowed dramatically during the 50 years. By 2025 urban population had surpassed 256 million. No dramatic changes occurred in either crude birth rate or crude death rate. Urban per capita income, however, had fallen to half its original level by 2025. During the simulation period the number of persons emmigrating out of the urban class slowly declined. Thus, the "brain drain" slowly tapers off.

The tremendous increase in urban population can be better understood by examining the rural to urban migration trends. During the simulation period there was a substantial steady outflow of persons into urban areas. The movement was, in fact, so great that rural population declined steadily. The increasing rate of population decline had reached one percent by 2025.

By the end of the simulated time period crude birth rate had dropped to less than 30 per thousand. At the same time crude death rate rose as the older individuals who failed to migrate died off.

The income picture in rural areas is not quite so bleak as urban conditions had appeared. Although per capita income declined, the decline was much less drastic than in urban areas. A note of caution should be taken, however. It is likely that such income figures present an overly optimistic picture. Given that such figures are computed on a per capita basis, the declining population in the rural class greatly affects such statistics.
As was stated above, this simulation run serves as a standard against which subsequent simulation runs will be compared and contrasted. Before examining the effects of policy related scenario runs, however, a brief examination of the effects of some image related model changes will be undertaken. Whereas the scenario analysis which follows focuses primarily on parameter changes, the discussion below focuses on changes in the basic structure of the model.

In the first major section of this chapter the model structure of "SAINT 2" was examined. In that discussion the close correspondence of "SAINT 2" to the Western image was stressed. The question might be asked, however, what happens if the reader or model operator is not in agreement with specific aspects of the model? The answer is, fine. In fact, one of the most important characteristics (advantages) of employing simulation for decision-making purposes is the tremendous flexibility of computer models. The operator can simply modify specific aspects of the model to his or her satisfaction and then rerun the analysis, comparing the results with those of previous runs. Such an exercise should help the operator to better understand the implications of his own image as well as provide him or her with a much better basis for evaluating the original model structure.

Tables 34 and 35 present the results of a simulation run in which such a modification was made. To illustrate the implications of such structural modification, the effects of the environmental fertility factor were turned off. Thus, in this run the role of population was
TABLE 34. SAINT 2: STANDARD RUN WITHOUT ENVIRONMENTAL FERTILITY FACTOR

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<th>PRODEF</th>
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**TABLE 35. SAINT 2: STANDARD RUN WITHOUT ENVIRONMENTAL FERTILITY FACTOR CLASS INDICATORS**
simply to serve as a basic accounting mechanism for other relationships.

Comparing the results presented in these tables with the results of the standard simulation run, several interesting observations can be made. First, only relatively minor differences result with respect to total population and growth rate of total population. When the environmental fertility factor is turned off, a slightly higher rate of population growth occurs. Similarly, small increases in levels of unemployment and nutritional deficiencies can be noted.

With respect to class specific indicators some more interesting results can be noted. Although there appears to be little difference in urban patterns, notable changes in rural indicators occurred. Rural crude birth rates remained much higher throughout the period of the simulation with the environmental fertility factor turned off. At the same time crude death rates remained lower than in the standard run. The resulting gap between CBR and CDR is thus substantially greater than in that simulation run. Migration and emmigration remain at high and fairly constant levels, as opposed to the decreases noted above. These combined demographic changes result in a fairly stable rural population size and growth rate. In addition, it should be noted that an only slightly lower ($602 as opposed to $632) per capita income level results.

Any conclusions drawn from the above discussion should be qualified regarding superficial treatment given the model structure in
this study. "SAINT 2" is a fairly complex model, consisting of numerous submodels. Only the skeleton of the simulation has been presented above. Thus, basing conclusions about simulation behavior on the results of 16 selected indicators could be misleading. However, certain limited observations can be offered.

By turning off the environmental fertility factor direct effects of changes in income and education on fertility have been excluded from the model. Therefore, the observer might expect substantial changes in demographic indicators. Given both images identified above, such a result would not be surprising. Thus, increases in population size and growth rate, as well as the changes in rural population variables, are to be expected.

However, some interesting observations can be made regarding aspects where the images do differ. The main point of difference between the two synthesized images concerns the impact of population on social and economic conditions. Adherents of the Western image articulate the belief that the effects of rapid population growth and change on social and economic variables is substantial and thus a great hinderance to social and economic development. Supporters of the other image argue that the effects of such demographic changes are inconsequential.

The results of the simulation run allow us to explore this debate, albeit indirectly. Comparing the indicators for the rural class between the two simulation runs, it can be noted that while the population sizes in 2025 differ substantially, per capita
income is only marginally affected. In addition, with the environmental fertility factor turned off, crude death rates are somewhat lower. Thus, even though the exact impact of population growth on social and economic conditions is not clear, it does not appear that such an influence is substantial. The reader must be cautioned again, however, that such a conclusion is very tentative.

In conducting simulation runs in "SAINT 2" the model places fairly severe constraints on the types of policy alternatives considered. For example, the operator cannot meaningfully distinguish among alternative fertility control measures. Only very gross types of alternatives can be examined. Even in those cases, the interpretation of much of the meaning of both the input and output depends on the nature of the particular scenario being employed by the operator.

Policy simulation runs employing three distinct scenarios were conducted. These runs were undertaken to examine changes in the monitoring variables as a result of "policy" changes in various parameters. The first policy simulation run examines the effects of a fairly rigorous fertility reduction policy. The second scenario looks at the effects of high economic growth. The final scenario examines the joint impact of high economic growth and a somewhat less rigorous birth control initiative. The results of these scenarios will now be discussed.

In the "high" birth control scenario an extremely vigorous fertility reduction program was implemented. The results of this
simulation are reported in Tables 36 and 37. The fertility rate is reduced steadily so that by 1985 the rate was seven-tenths of its 1975 level. Then, by the year 2000 the rate was further reduced to six-tenths of the 1975 value. Thus, it can be seen that fairly strict assumptions were being instituted.

Given this scenario, some interesting findings emerge. As would be expected, total population is substantially reduced by 2025 (slightly less than six-tenths of the total population resulting from the standard run). The growth rate of total population is less than one-half that reported above. Unemployment completely disappears and a substantial job surplus develops. No protein deficit develops, and the Calorie deficit is relatively low.

Urban population growth slows dramatically, while the decline in rural population size intensifies. Crude birth rates in both classes drop substantially. The crude death rate for the rural class, however, almost doubles by the year 2025 from its 1975 level. Although per capita income declines in the urban class, the reduction is much less than that reported in the standard simulation run. Interestingly, per capita income for the rural class shows a modest increase.

Reviewing the results of the high birth control scenario, a more positive picture emerges regarding the trends of the monitoring variables. Except for the increased crude birth rate for the rural class, the policy simulation results are much closer to the generalized organizational goals than were the results of the standard run.
### TABLE 36. SAINT 2: HIGH BIRTH CONTROL SCENARIO

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The next scenario undertaken will be called the high economic growth scenario. In this run the parameter establishing the rate of economic growth is modified. In the standard simulation run the annual rate was set at three percent. In this scenario the rate is steadily increased to reach three and a half percent by 1985 and four percent by 1990. Then, the trend is reversed to slow the rate of increase to three and a half percent by the turn of the century. The rate is then held at that value through the remainder of the simulation run. The results of this scenario are reported in Tables 38 and 39.

Total population size and growth rate are almost exactly the same as in the standard run. Also, the values reported for the protein deficit, Calorie deficit and migration variables are very similar. Unemployment, however, is substantially reduced. Total unemployment in 2025 represents only 4.3 percent of the adult population.

The values for the class specific indicators are for the most part very similar to those of the standard run. The only exceptions are per capita income figures. The reduction in urban YPC is somewhat reduced. In the scenario run per capita income in 2025 for the rural class shows a slight increase over the 1975 level.

Comparing this policy simulation run with the high birth control scenario, we find that the desired impact of high economic growth is substantially lower. However, the scenario results do indicate that, given the nature of the system as modelled, significant improvements can be made in economic conditions regardless of demographic changes.
<p>| TABLE 38. SAINT 2: HIGH ECONOMIC GROWTH SCENARIO |</p>
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<th>POP U=76</th>
<th>CON U=70</th>
<th>CON U=76</th>
<th>YPC U=70</th>
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<th>POP U=76</th>
<th>CON U=70</th>
<th>CON U=76</th>
<th>YPC U=70</th>
<th>POP U=70</th>
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<td>0.722658</td>
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**TABLE 39. SAINT 2: HIGH ECONOMIC GROWTH SCENARIO, CLASS INDICATORS**
Thus far, each scenario has involved changing only one basic parameter. In doing so, the effects of specific policy interventions were examined, while all other factors were held constant. However, it is also instructive to examine the impact of a policy package (more than one program). Many individuals, such as Hardin (1972), argue that you cannot just do one thing. In other words, the solutions to problems in complex social systems might require a mixture of different policy initiatives. Thus, the last policy simulation run will explore the results of such an attempt.

In this run high economic growth rates were once again instituted. In addition, a fertility control scenario was also included. In this run, however, the birth control scenario was much less rigorous than before. By 1985 the fertility rate is reduced to only nine-tenths its 1975 value. Then, by the year 2000, it is further reduced to eight-tenths of the original value. Tables 40 and 41 present the simulation findings.

The overall changes in the values of the demographic indicators are smaller than occurred under the high birth control scenario. In most cases the changes are about half the magnitude of the previous simulation. For example, total population size in 2025 is 217 million as opposed to 279 million in the standard run and 157 million in the previous birth control run. With reference to crude death rates, such reduced values are quite welcome. Crude death rate for the rural class increases to 14 per thousand as opposed to the 17 per thousand level before. Indicators of nutritional deficits are higher than had
### TABLE 40. SAINT 2: LOW BIRTH CONTROL/HIGH ECONOMIC GROWTH SCENARIO

<table>
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<tr>
<th>Year</th>
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**TABLE 41. SAINT 2: LOW BIRTH CONTROL/HIGH ECONOMIC GROWTH SCENARIO, CLASS INDICATORS**
resulted from the previous simulation. However, such deficits were well below a critical starvation threshold. A job surplus, even larger than was reported before, develops during this simulation. Per capita income levels, although somewhat lower than those achieved during the previous birth control run, are substantial improvements over either the standard run or the high economic growth (only) run.

Attempting to generalize about these comparisons is extremely difficult. Although the high birth control only run might appear overall to be the optimal policy, it would be unwise to draw such a conclusion. Many additional factors must be considered in the decision process. Not least important are the sets of constraints that delimit the policy activities of organizations. As was discussed in Chapters I and II above, organizational goals comprise more than just the value premises of individuals. Organization role constraints must also be considered.

Such considerations draw the discussion closer to the heart of politics. Who can do what, with respect to what goals, with what likely effects? To answer this question, a review of organizational goals is required. Beginning with value premises regarding the desired state of affairs of the organizations' outer environments, the most widely shared valued outcome was the improvement of the well-being of the poor. Each of the organizations appeared to place population assistance activities within this larger frame of reference. Thus, the effects of such policies on all the monitoring variables need to be considered.
The discussion of the constraints on organizational activities is divided into two parts: constraints shared across organizations, and constraints specific to organizations. Shared constraints will be assumed to be held constant for the purposes of this discussion. Thus, it is the constraints specific to individual organizations to which the discussion will turn.

The Office of Population of the United States Agency for International Development is but a small part of an extremely large bureaucratic organization which is, in turn, only a small part of a much larger institution, the government of the United States. Thus, role constraints on this agency are substantial. For example, the Office must work within a mandate from Congress and must coordinate its policies with the larger organization of which it is a part. Even though the Office is staffed with many population experts, these individuals must tailor their programs and policies to fit the larger picture. Thus, population policy is treated as only one means to a greater end, increasing the overall well-being of the poor.

In an international context, however, the picture looks very different. USAID, through the Office of Population, is the leading (largest funding) population assistance organization in the world. Thus, other bodies often look to the organization for leadership support. Several internal operating codes constrain USAID's ability to provide such assistance, however. First, assistance is provided only on request. Second, individual freedom of choice is required of programs supported. Third, AID is not supposed to advocate any specific policy. Also, the programs should be cost-effective.
An additional, unofficial constraint must also be brought to the surface. AID is part of the United States Government's foreign affairs bureaucracy. Thus, regardless of official statements to the contrary, the possibility that political consideration might enter the decision-making process must be entertained.

These factors, then, represent the constraints that delimit USAID activities in the realm of population assistance.

With reference to these constraints, it is argued here that among the three alternative policy scenarios the mixed birth control-economic growth option is the most attractive. Even though the high birth control scenario yields higher levels of per capita income and lower nutritional deficits, the mixed policy scenario fits AID's organizational goals better. This argument is based on several factors. First, individual freedom of choice is required of AID supported programs. It appears doubtful, however, that the high degree of cooperation necessary to implement such a rigorous birth control policy would be possible, given the initial conditions of the simulated society. To carry out the high birth control option would probably require at least some degree of coercion on the part of the implementor. Second, AID provides assistance only on request. A rigorous, totally population oriented policy would tend to have much less appeal to governmental leaders in client societies than policies which are perceived to more directly improve economic development concerns.

Another major constraint is closely linked to the provision that assistance only be granted on request. This constraint is the larger
political context in which AID is institutionally located. Given that AID is part of the United States foreign affairs bureaucracy, it is highly possible that some developing world leaders might view any attempt by AID to provide assistance solely for fertility control policies with great suspicion and/or contempt. This was the position argued by the delegates from the Chinese Peoples Republic and elsewhere during the Bucharest Conference.

The low birth control-high economic growth mix provides an attractive option. At the same time, substantial progress toward the realization of the generalized goals was demonstrated during that simulation run. Thus, for the reasons stated above, it is argued that this policy option best suits AID's purposes.

The organizational goals of the Population Council are substantially different from USAID's. AID is an action oriented agency, with reference to formulating and implementing transnational population assistance programs. The Population Council, on the other hand, is primarily a research and knowledge utilization oriented organization. This orientation clearly emerges from the Council's "Guidelines and Principles." With reference to the results of the simulation exercise discussed above, a clear role for the Population Council emerges. A critical review of the exercise reveals many shortcomings which must be confronted if computer simulations are to more fully aid policy decision-making. First, additional empirical analysis is necessary regarding the specification of relationships among demographic, social and economic factors. Second,
better, more reliable data sources need to be developed on which such analyses can be undertaken. Third, political and cultural factors need to be incorporated into computer models if they are to serve as valuable policy tools for evaluating alternative assistance programs.

Fourth, The Population Council could serve as a leader among the assistance organizations in developing utilizable computer models for training bureaucrats, as well as entire communities, about the broader aspects of population (system) dynamics, including the implications of images for the development of population/development policies.

The changing organizational role of the Ford Foundation places it in a very similar position as The Population Council. Thus, in terms of the Foundation's research role, the discussion immediately above seems applicable. With reference to the Foundation's goal of capacity building in the developing world, the incorporation of political factors in demographic-economic models should be a top priority. Such models could serve as valuable tools in assisting the Foundation with such institution building activities.

The Population Council and Ford Foundation could, thus, jointly share the role of assisting decision-makers around the world to better understand the dynamics of demographic-economic relationships. The importance of such a role can be demonstrated in the context of the policy simulation runs and the discussions of USAID above. In the above discussion it was suggested that, even though the high birth control scenario produced the greatest desired movement in the
monitoring variables, such a policy (given AID's organizational goals) was of questionable applicability. Concentrated effort on improving and disseminating information regarding such relationships by organizations such as The Population Council and Ford Foundation could bring such policies within the realm of political acceptability.

The UNFPA is an action oriented agency in a large institutional setting. One of the major organizational goals of the Fund is to coordinate all population activities in that institution, the United Nations. Unlike the USAID, the Fund is not constrained to act solely on the requests of governments and organizations. However, the Fund must operate in such a manner as not to challenge the "internal competence" of national governments in population matters. The organizational goals of the Fund are much more specifically focused on population assistance activities than are the other three organizations. The Fund is not responsible for providing assistance for general developmental goals. The Fund is also constrained in that a majority of its contributions come from a very few sources. In addition, the UNFPA is supposed to be neutral with regard to the particular type of assistance granted.

Given these relatively severe constraints, it appears that one of the Fund's greatest potential contributions is in funding multi-organizational efforts into expanding the knowledge base relative to demographic-economic relationships. A second major contribution would be the continuance of the Fund's role in focusing and
coordinating United Nations population activities. Given the results of the policy simulation runs and the orientation of the Fund's organizational goals, the UNFPA emerges as the organization in a position to champion the importance of population assistance in developmental planning.

All of the organizations operate out of an orientation based on a Western image. The main research puzzle confronted in this study was the identification of ways to aid decision-makers in better understanding their images and the implications of those images for the attainment of organizational goals. In solving this puzzle, the following activities were undertaken. The organizational goals of four selected population assistance organizations were identified. These goals serve as standards against which to evaluate changes relating to the organizations' outer environments. The general trends at regional and global levels to or away from the attainment of these goals were described. Then, transnation responses to rapid population growth and change were examined. In the context of such responses, the international "debate" concerning the nature of the interrelationships among demographic, social, and economic variables was explored. From this debate competing images were identified. The next task was to critically examine and synthesize the findings of scholarly research regarding such interrelationships. This exercise led to the specification of a simple system dynamics flow chart of important relationships emerging from the literature review and consistent with the Western oriented image. Next, a one-region
integrated computer model, consistent with the Western image, was employed to more closely examine images by altering various demographic-economic interrelationships. Also, the simulation was utilized to conduct policy simulation runs. During these runs various scenarios were employed to examine the possible effects of alternative policies on the attainment of organizational goals. Returning to a discussion of organizational goals, the final research task undertaken was to explore the political implications of the findings of this study for the attainment of organizational goals.

A general conclusion that can be drawn from this study is that the greatest impact that images have on the attainment of organizational goals operates through the process by which images effect the formulation of such goals and the subsequent selection of policy alternatives. Thus, if social scientists are to aid individuals in authoritative positions to better understand the implications of differing images for the attainment of organizational goals, the five problem solving tasks of the policy sciences approach provide a sound framework. By employing such a frame of reference, both goals and images can be clarified. As a result, means for achieving organizational goals can be more systematically identified and evaluated.

Further research into this general question must be preceded by research into the areas outlined above for The Population Council. A more reliable, comprehensive data base needs to be developed with regard to social and political indicators. Political and cultural factors need to be incorporated into demographic-economic models.
Further research into the interrelationships among social, political, demographic and economic variables is imperative. And finally, means of collecting and disseminating information on these matters on an international basis needs to be developed and maintained. It is toward these objectives that policy scientists need now turn their concerns and expertise.
APPENDIX A

REGIONS AND NATION MEMBERS

1. North America: Canada, USA

2. Western Europe: Andorra, Austria, Belgium, Denmark, Federal Republic of Germany, Finland, France, Great Britain, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland, Turkey, Yugoslavia

3. Japan

4. Rest of Developed: Australia, Israel, New Zealand, South African Republic

5. Eastern Europe: Albania, Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Rumania, Soviet Union

6. Latin America: Argentina, Barbados, Bolivia, Brazil, British Guyana, British Honduras, Chile, Columbia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, French Guyana, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Surinam, Trinidad and Tobago, Uruguay, Venezuela

7. Middle East: Abu Dhabi, Aden, Algeria, Bahrain, Cyprus, Dubai, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morrocco, Masqat-Oman, Qatar, Saudi Arabia, Syria, Trucial Oman, Tunisia, Yemen

APPENDIX A (continued)

9. South East Asia: Afghanistan, Bangladesh, Burma, Cambodia, Ceylon, India, Indonesia, Laos, Malaysia, Nepal, Pakistan, Philippines, South Korea, South Vietnam, Taiwan, Thailand

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